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# THE IRRIGATION AGE

CHICAGO, ILLINOIS

With Which Is Merged

**National  
Land and Irrigation  
Journal**

NOVEMBER, 1915

Vol. XXXI

TITLE REGISTERED U.S. PATENT OFFICE

No. 1

## THE AUSTIN LAND DREDGE

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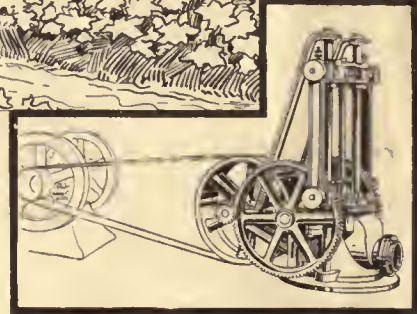
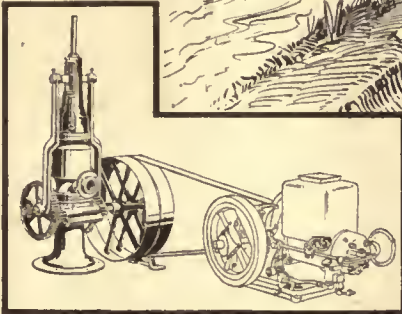
## INSURES STRAWBERRY CROP BY IRRIGATION

The biggest strawberry farm in the world is in Michigan—the very heart of the rain belt. Nevertheless it is an irrigated farm. The owners put in an overhead system, first, to insure the crop, and second, to bring that crop to the most perfect development possible. Read F. W. Parks' story in this issue of THE IRRIGATION AGE.



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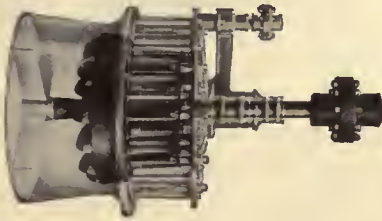
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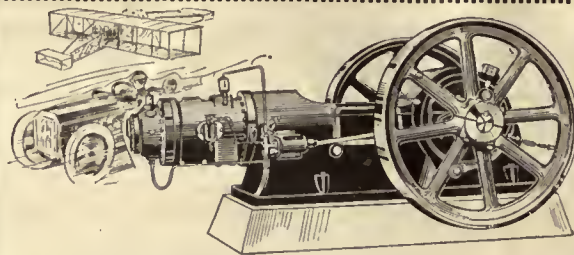
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## A STUDY IN CONTRAST

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Did you ever ride along a country road with your eyes open when crops were maturing? If you have, you will remember a field of grain that was way below standard and right away you prophesied that Mr. Jones or Mr. Smith or Mr. Brown or whoever the farmer might be that owned that particular field, was going to have some empty bins a little later on that should have been heaped high.

While you were still prophesying to yourself, you came to the next field just across the fence, and immediately there was a remarkable change. Prospects were great for an enormous yield and you wished you could have even a small portion of the money that field would be worth in a couple of months or so to the owner. Then you began to wonder WHY the difference, and you remembered that back yonder the last barnyard you passed was filled with manure—all kinds of it—no good to anybody or anything.

While you were still meditating, thinking how much benefit might have resulted from proper distribution of that manure—how much more the first field might have been worth—you passed the next barnyard and what a change. The ground scraped clean of all manure and a Litchfield Spreader in the corner told where it had gone to.

Automatically, your mind reverted back to an article you read in the farm paper the day before. It went something like this: "Enough manure goes to waste on SOME of the farms of the United States, through imperfect distribution by hand or because of no distribution at all, to pay the taxes on ALL of the farms of this same United States." Moral: Put manure where it belongs—in the field—let the Litchfield Spreader pay the taxes. Write for new catalogue, just off the press.

**The Litchfield Mfg. Co.**  
Waterloo, Iowa

When writing to advertisers please mention The Irrigation Age.



Thirtieth Year

# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, NOVEMBER, 1915.

No. 1

## THE IRRIGATION AGE

With which is Merged

The National Land and Irrigation Journal

MODERN IRRIGATION

THE IRRIGATION ERA

ARID AMERICA

THE WATER USERS' BULLETIN

THE DRAINAGE JOURNAL

MID-WEST

THE FARM HERALD

THE IRRIGATOR

D. H. ANDERSON

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CHICAGO

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D. H. ANDERSON, Editor

### ANNOUNCEMENT.

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Official organ Federation of Tree Growing Clubs of America. D. H. Anderson, Secretary.

The Executive Committee of the National Federation of Water Users' Associations has taken action whereby THE IRRIGATION AGE is created the official organ of this vast organization, representing 1,000,000 persons on the government irrigation projects.

## Interesting to Advertisers

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 30 years old and is the pioneer publication of its class in the world.

Bird and game reserves have been created in and around the sites of nearly all reservoirs and other head works of the Federal irrigation projects.

And yet Secretary Lane is collecting hard-earned money from the settlers for the cost of these works.

Why should they pay for anything to which they cannot get title? To begin with, the law provides that the government shall keep the main works until congress directs otherwise. And does it stand to reason that the government is going to sell these bird and game reserves? No!

Charge off the costs of these works and then the settlers will only have to pay about the amounts provided in their contracts with the government for their water rights. Then they will have a chance to succeed in building up homes in the desert country.

The silo makes it possible to raise more feed and to keep more cows on the same acreage and substitutes certainty for uncertainty in the management of the herd to an extent impossible in any other way.

Is education worth while for the farmer? A great many indefinite answers have been given by people who have only their own opinions and limited observation. A more definite answer has just been given by Professor O. R. Johnson, of the Missouri University College of Agriculture.

Professor Johnson has carefully studied data, secured by visits to 656 farmers, 554 of whom had only rural school education, while the remainder had secured more or less additional training. While he recognizes the fact that this additional training is not solely responsible for the better showing made by the better educated man, there is every reason to believe that their additional education has been a very valuable investment, from the standpoint of the pocket-book as well as that of social service, which is not so easily measured.

The better trained men secured average labor incomes of \$655 a year, or within \$110 of twice as much, as those who had only district school educations. This labor income is the net return left after allowing 5 per cent interest on the value of the farm and equipment used and reasonable charges for other items. The educated farmer handled more

land of a higher average value per acre and rented from others only one-fifth of the farm he operated, while the less educated man rented nearly two-fifths. The same general difference appears, though not always to so great an extent, in the number of acres handled per man employed, the number of acres handled per horse, and the yield secured per acre.

Give your boy all the schooling you can afford. Then encourage him to work to acquire still more.

**Abel Ady Is Dead;** Settlers on the Klamath (Ore.) Federal irrigation project have lost a staunch and competent leader. Abel Klamath Loses Ady is dead.

**Real Leader** As president of the Klamath Water Users' Association, Mr. Ady was untiring in trying to better the conditions of his people. He accomplished much for them.

He was a man of big ideas. He was a close student of co-operation and he had made extensive plans to bring the Klamath organization to a point where it would exercise all the tremendous powers with which Water Users' associations are endowed, for the good of the settlers.

The Klamath water users should erect a monument to Abel Ady by putting into effect his ideas for self-help on the project—a water users' bank, that will not demand loan shark interest to help a farmer, co-operative marketing and association control of the project.

**Bankers Seek Best Rural Credit System** Members of the Kansas Association of Bankers, in their search for a satisfactory rural credit system to handle Kansas farm mortgages, have obtained information that should be of value to every western state and its farmers.

Some time ago a committee was appointed by the Kansas association to investigate the various rural credit plans of various countries. It has just completed its report. After reviewing the systems used in European countries and digesting the various bills pending in congress, the committee believes that the different states can work out a system for their respective localities better than the Federal government can. In other words, they believe that it will be difficult for congress to work out a uniform law for all the states that would be acceptable.

Of all the systems investigated the committee reports that the one used by a banker in Illinois, under existing laws, seems the most practicable. In 1913 this banker began issuing 5 per cent bonds under the amortization plan employed by his bank. The bonds run for thirty years and are based on the

collective security of Illinois 5 per cent amortizable first farm mortgages. During the year 1913, when 2 per cent United States bonds were selling below par on our markets and other securities had greatly depreciated, he sold between \$300,000 and \$400,000 of these bonds.

This, or some well-guarded plan for rural credits, based on first real estate mortgages payable under the amortization plan, together with the issuance of bonds based upon the mortgages so taken and provisions made for the sale of such bonds, the committee believes, would be the most practical way to provide this credit capital for the farmer and help develop the agricultural resources of the state.

"The law now upon our statutes bearing upon this subject," says the committee in its report, "does not provide that a bank, as a bank, can issue certificates and make loans. It would therefore be necessary to organize an association as a side line to the bank to cover this line of business. The amortization plan appeals more strongly to the committee than any of the proposed plans now pending in congress."

**A U. S. Answer** Does co-operation succeed? Here is an answer from the United States consular reports:

**to Foes of Co-operation** "The Leeds (England) Industrial Co-operative Society reports \$5,166,909 total sales for the half year ended June 30, 1915, or an increase of \$1,225,696 over the like period of 1914 and a record for the society. The share capital stood at \$4,703,277, an increase of \$226,462, and members increased by 1,818 to 49,785. After allowing \$80,973 for interest on capital and \$53,453 for depreciation, the amount available for distribution was \$662,353, which was disposed of as follows: Dividend on members' purchases aggregating \$4,763,866, at 2s. 9d. in the pound (about 13¾ cents on each dollar's worth purchased), \$655,030; for educational purposes, \$4,858; balance to next half year, \$2,465."

**"Air Drainage;" Do Not Overlook It** It is a well recognized fact, though one too often overlooked in selecting sites for orchards, that cold air settles to the lower levels. For this reason it is often colder at the lower elevations than it is at higher points in the same locality. This is what is meant by "atmospheric drainage." The occurrence of frost in low places when there is none on elevated areas is thus explained. For the same reason peach buds are often winterkilled or the blossoms are injured by frost in the spring in low places when near-by orchards on higher elevations are injured much less, or even escape entirely.



# INSURES STRAWBERRY CROP BY IRRIGATION

Overhead System Installed on Largest Strawberry Farm in World

By F. W. PARK



Always certain of rain—The overhead irrigation system on the Kellogg farm

**F**EW people realize that the strawberry business of the United States ranks only second in horticulture to the apple crop, and that each year there is a rapid increase in this industry.

The largest grower of strawberry plants in the world is the R. M. Kellogg Company, Three Rivers, Michigan. Beginning with a few acres of strawberries, over thirty years ago, the farm of this company has increased in size until it now comprises an immense plantation with over 225 acres planted to strawberries, and the strawberry plants grown on this farm are shipped to every agricultural county in the United States, throughout the provinces of Canada, to Australia, China and Japan and to many of the countries of Europe and South America.

To maintain its reputation for furnishing only the most vigorous plants of pure breed, this company has constantly striven to improve its cultural methods. One of the difficulties to overcome was the uncertainty of the rainfall, and it was decided that an overhead irrigation system offered the logical solution of this problem, since the fine sprays of this system afforded the best possible means of watering delicate plants. The lands of this company are very level, and therefore well adapted for an irrigation system, and the Portage River flows along one side of the farm and furnishes an inexhaustible supply of water for pumping. Early in the present year the primary irrigation system, covering 65 acres, was installed, and to this the Kellogg Company expects to add year by year until the entire farm is under irrigation.

After a thorough investigation of the overhead irrigation systems operating throughout the country, it was decided to install the Skinner system, made by the Skinner Irrigation Company, Troy,

Ohio, and the results of the first season of service have proved very satisfactory. The accompanying illustrations show interior and exterior views of the pump house and a part of the overhead pipe system.

The quantity of pipe required for this initial installation was in excess of 300 tons, and if the overhead piping were strung out in a single line it would extend a distance of approximately 25 miles. The pumping plant is located on the bank of the river, about the center of the side of the farm. Water is elevated to the top of a bluff, about 50 feet high, from where it is forced through an underground main discharge line, which extends across the center of the farm, and from which 6-inch and 4-inch lateral lines lead to risers connecting with the overhead system. All of the underground pipe is of cast iron. The lengths of piping have bell and spigot ends and are leaded together. Each of the feeder lines of pipe is equipped with a valve, by means of which the water may be turned on or off, so that any desired part of the system may be placed in operation.

All of the overhead piping is of galvanized iron, and ranges in size from 2 inches down to  $\frac{3}{4}$  inch pipe, the greater the distance from the source of water supply, the smaller the pipe. The decrease in the size of pipe in the ratio of distance is for the purpose of maintaining a uniform flow through the entire system.

The overhead pipes which carry the water over the fields rest upon risers about seven feet above ground, and at intervals of about three feet along these lines nozzles are placed through which the water flows. As the



Another view of the irrigation system.



The pump house



water is forced through these small nozzles it breaks into a mist of exceeding fineness, so that the impact of the water on the plants beneath is very light, while every particle of the surface of the earth and the plants are saturated. The company reports that this form of irrigation is far more beneficial to the soil and plants than the natural rainfall.

The supply lines of pipe are placed 52 feet apart, and the water, when thrown horizontally, overlaps in the center of the intervening space. In other words, the water of each pipe line is thrown horizontally a distance in excess of 28 feet. When it is desired to throw water upon the plants nearer the pipes, this is accomplished by a special pipe turning device, by means of which the nozzles may be turned to any desired angle. When the nozzles are turned directly upward the water, of course, falls on the plants directly underneath.

The power plant consists of a building 12x15 feet, inside measurements, built of concrete blocks, and has a cement floor. The water is taken directly from the river through a fine meshed screen. The pump was manufactured by The American Well Works, Aurora, Ill., and is an 8-inch, Type DTMD, horizontal, single-stage, double suction, split shell, turbine centrifugal, designed to deliver normally 1,050 gallons of water per minute against a 176 ft. total head. The pump is driven by a 75-horse-



Interior of pump house.

power, 3 phase, 60 cycle, 220 volt, slip ring General Electric motor, operating at 1,740 revolutions per minute. A feature of this pump is that while it maintains a mechanical efficiency of 73.5 per cent at its most economical delivery, it is so designed that it has an efficiency in excess of 70 per cent through a range of delivery of from 750 to 1,300 gallons per minute. The broad efficiency curve obtained on this pump especially adapts it to this class of service, on account of the variation of capacity demand on the

quantity of water pumped, due to the varying number of nozzles in service.

The operation of this system is divided into three shifts, of approximately equal acreage, and when operating one-third of the system, the pressure gauge indicates 75 pounds pressure at the pump. When in operation, 60 gallons of water per minute are required for each acre, and it requires about four hours to thoroughly saturate each 22 acre tract, or about 12 hours to irrigate the entire 65 acres.

Owing to the unusual amount of rainfall during the last summer, cost data covering the operation of the plant for a considerable period of time under normal conditions are not yet available, but the company expresses the highest satisfaction with the installation, and asserts that it can now "make rain while the sun shines," and thus defeat the influence of the drouths which have so frequently caused it serious loss.





# The Federal Water Users



A Department Devoted to the  
Interests of the Farmers on the  
Government Irrigation Projects

EDITED BY GEORGE J. SCHARSCHUG

## LET CONGRESS SEE COST REVIEW REPORTS

SECRETARY of the Interior Lane's revaluation reports on the Federal irrigation projects are gradually percolating into headquarters.

Minority reports by Reclamation Service members of the various Boards of Review have proved very effective brakes in attempts to bring quick action and possible relief to the settlers through the revaluations.

According to present indications it may be years before the final board hands down its decisions.

Except that the settlers have new bills to pay, there is now no outlook that the reports will prove of much value.

There is one possibility of relief. The settlers have had opportunity to make records of their contracts with the government and to offer evidence of waste, extravagance and incompetence in the construction work on the projects.

If the reports can be brought before congress, this evidence may result in the righting of many wrongs and the lifting of unjust burdens under which the settlers are laboring.

There is little hope of such relief from the Department of the Interior.

With the evidence before it, congress can hardly refuse to stop the attempt to make the settlers pay for reservoirs, dams and other main works to which, under the Reclamation Act, they cannot get title.

Also, congress will insist, we believe, upon the government keeping its original contracts with the settlers and halt the present Shylock methods of increasing the cost of water rights.

Some Western congressman should demand that these reports be laid before congress at the earliest moment during the December session.

It is time the settlers knew just what size bill they must pay to the government. Then they can begin financing their farming operations.

The revaluation report in the Uncompahgre, Colo., project was compiled last month. After questioning George W. Bruce, of Delta, Colo., president of the association and settlers' member of the board, the Montrose Enterprise says:

"Mr Bruce declared that we had made a strong case on the basis of the original understanding of a cost of \$25 an acre—that the evidence shows that it was quite apparent that the people and the government officials began the work on the project on the proposition that it would not cost to exceed \$25 an acre. Just what effect this contention will have Mr. Bruce did not know, but all other items he considered as small matters compared to this one contention as to the cost of the project in the under-

standing of the land owners when they signed up their land to the project."

At a recent meeting of the Lower Yellowstone Water Users' Association, Burton S. Adams reported to the settlers as follows:

"J. B. Bond, representing the Reclamation Service, declined to sign the majority report and announced that he would make a minority report, and worked on one all the time the majority report was being compiled, with the assistance of Attorney Roddis and the Reclamation Service, and announced that we would be served with a copy immediately, and allowed to supplement our report on any new matter introduced; and it is now over a month since our report was made, and we are still awaiting the minority report of the Reclamation Service.

"We have been instructed by the Secretary of the Interior not to make public any of the report of the Board of Review until after action by the Central Board of Review and the Secretary of the Interior."

### SPROUT WEEDS BEFORE PLANTING

In land which has been under cultivation for some time there is apt to be a great quantity of weed seeds. A clean stand of wheat or other winter crops may be secured on such land, says John P. Orme, president of the Salt River Valley Water Users' Association and a successful farmer for thirty years, by giving a light irrigation early in the season. This will sprout the weed seeds, and when they have made a growth of about six inches, the land should be plowed eight to twelve inches deep. The soil will then be ready to irrigate heavily and prepare for winter crops. Sour clover seed does not germinate until the weather commences to get cool; so, if it is desired to kill this weed, it should be first allowed to germinate.

### IT PAYS TO IRRIGATE

The question, "Does irrigation really pay?" was very forcibly answered in the experience of W. B. Davis, who lives on a rented irrigated farm near Hereford, Tex.

Mr. Davis had 140 acres in wheat, and, after irrigating some 36 acres one time, decided that it really did not pay to irrigate and let the rest go. Imagine his surprise when he cut and threshed his crop; the irrigated wheat made 34½ bushels per acre, while the rest only made 18½ bushels, just 16 bushels less.

For the irrigated wheat he received 7c per bushel more because the grain was so much better.



## LANE FORCED TO STOP LAND GRAB

A NUMBER of Reclamation Service officials and employees, who grabbed the cream of 157 farm units opened recently on the Uncompahgre, (Colo.) Federal Irrigation project, must look elsewhere for farms.

Following sharp protests from Colorado, Secretary Lane issued the following order to the Registrar at Montrose:

"You are directed to cancel the entries of the Reclamation Service employees who have filed upon the Uncompahgre project since September 15, 1915, and to withdraw all lands opened on September 16, not entered upon at this date. It appears that the notice of the coming opening of these lands was wired to Colorado and there published more than ten days before the date of opening, but that the instructions as to further publication intended for the land of-



Yes! Irrigation helps the crops.

Of course, there may have been an honest mistake, but the whole deal looked very rotten to these men on the ground.

fice officials, miscarried."

This leaves the situation as it was before the order opening the land with exception that those filing on the land outside of the Reclamation employees will retain their filings. Just what will happen with the rest of the land only time will tell, but certain officials who are in close touch with the department are of the opinion that this will end the land opening under the project for the time being, and probably until the entire project is completed.

Directors of the Uncompahgre Valley Water Users' Association voted to draft a resolution censuring the government for the manner in which the opening was conducted.

## GREEN MANURE HELPS START ALFALFA

THE report of experiments conducted during the year on the Yuma Reclamation Project Experiment Farm near Yuma, Ariz., shortly to be issued by the United States Department of Agriculture, devotes special attention to a discussion of the method of raising Durango cotton, and also discusses alfalfa and sorghum culture in this region. One section of the report is devoted to Sudan grass, and there is mention of experiments with hemp, flax and broom corn.

The following advice on the use of green manures, taken from this report, should be of interest especially to alfalfa growers:

"One of the most important values of alfalfa is its usefulness as a preparatory crop. It is the best green-manure crop yet found when all phases of its benefits are considered. However, a stand of alfalfa is often difficult to establish on very light, sandy areas or on spots in fields where heavy grading has exposed the sandy subsoil. Apparently, the difficulty experienced in establishing alfalfa stands on these soils is not a deficiency of plant food, but

a very irregular moisture content of the soil. This condition has been found to be most economically improved by the addition of a summer green-manure crop of cowpeas. Cowpeas when planted in a good seed bed have produced on sandy soil approximately four tons of green manure per acre. Alfalfa may then be seeded in the fall and become established for the following season.

"At the experiment farm the alfalfa yields have been increased 2 tons per acre by this culture. The field operations of growing and plowing under this crop of cowpeas would cost not to exceed \$4 per acre. If 2.3 acre-feet of water are applied to this crop at 50 cents per acre-foot, the water will cost \$1.16. Cowpea seed has been bought f. o. b. Yuma at \$8 per hundred pounds. If planted at the rate of 30 pounds per acre, the seed would cost \$2.40, making a total cost of \$7.56 per acre for two extra tons of alfalfa, which, in 1914, when hay was cheapest, was worth \$12.10, netting a profit of \$4.54 on the first year's results, as well as the residual effect on the soil. In an effort to determine the best

varieties of cowpeas to be grown as a summer green-manure crop, a collection of five varieties was grown under comparable conditions for green-manure production and also tested for seed and hay production.

"Of these varieties there are two, the New Era and the Groit, that appear to be distinctly superior to the others in green-manure or hay production. If

local seed production is to be considered, they are equally valuable for this purpose. Both are early-maturing varieties, the New Era being seven to ten days earlier than the Groit. One other variety, however, the Whippoor-will, not included in this test, is known to succeed well under these conditions."

## TURN OVER U. S. PROJECTS IN 1917; PERHAPS—

TO those settlers on the Federal projects who are looking forward to the day when the Water Users' Associations will assume control of the projects, the following letter is of interest:

"October 12, 1915.

"Mr. R. F. Randolph, Secretary Minidoka Irrigation District, Rupert, Idaho.

"Dear Mr. Randolph:

"Your letter of September 17, 1915, refers, among other things, to the question when a contract under which the irrigation district will undertake the operation of the gravity unit of the Minidoka project will be presented to the water users. As you know, this question has been under consideration for some time past, and there was presented to this office a form of contract which provided both for the turning over of the project to the district and for the district to act as fiscal agent for the United States in the collection of water charges. It has been considered by the Commission, however, that these two features should be made the

basis of separate contracts, and for this reason the contract submitted was not satisfactory.

"The district counsel has been given detailed instructions relative to the preparation of the contract for turning over the collections to the district and it is hoped that this feature may be disposed of at any early date.

"In the matter of turning over the operation of the project to the district, it is first necessary that proper rules and regulations shall be adopted in pursuance of the provisions of the Reclamation Extension Act. A tentative draft of such regulations has now been formulated and is receiving consideration. When these have been definitely decided upon the matter of the execution of a formal contract between the United States and the district will be taken up and we hope that it may be disposed of sufficiently in advance of the irrigation season of 1917 to enable all necessary details to be arranged.

"Very truly yours,

"A. P. DAVIS,

"Director and Chief Engineer."

## SHOW VALUE OF PUMP IRRIGATION

THE Kansas State Irrigation Congress struck some effective blows in favor of pump irrigation during its sessions at Garden City, Kans., in October.

Larned, Kans., will entertain the 1916 convention. E. Frizzell, of Larned, was elected president; E. J. Guilbert, of Gill, vice-president, and H. B. Walker, of Manhattan, state irrigation engineer, secretary. The last two were re-elections.

Pump irrigation, securing water from the underflow and other subterranean sources will increase the yield of corn in western Kansas by 35 to 60 bushels an acre, declared H. C. Diesem, irrigation engineer for the United States government. The cost of such irrigation should not exceed \$1.10 to \$2.40 per acre per season, exclusive of labor, he said. His investigations have shown that western Kansas land which yields 15 bushels of corn to the acre without irrigation will produce 50 to 75 bushels under irrigation.

A. A. Potter, dean of engineering at the Kansas State Agricultural College, emphasized the need of the use of pumping engines which burn some other sort of fuel oil than gasoline. Autos and flying machines soon will consume most of the output of gasoline, he declared.

For successful irrigation it is necessary that more attention be paid to pumping equipment, Prof. R. A. Seaton, of the Kansas State Agricultural College told delegates. Reliability and economy of operation, he said, are the two chief items which must be considered.

"Reliability is of vital importance, since a failure in the water supply at a critical time during the growing season will cause serious losses," he said. "In small pumping plants, the machinery must run with but little attention, and this from attendants who are not accustomed to the operation of complex machinery. The machines should, therefore, be as simple as possible and should be rugged in construction so they are not likely to get out of order.

"Economy of operation includes not only the cost of fuel or of power, if electric power is purchased, but also interest and depreciation on the interest and depreciation on the investment, and cost of lubricants, repairs and attendance. The items of interest, depreciation and attendance must be taken into consideration whether the owner borrows the money for the investment or uses his own money, and whether he looks after his own plant or hires his work done, since he is deprived of the use of his money and time for other purposes when he furnishes them himself."



## BOYS AND GIRLS' FARM CLUBS GROW

THERE has been an increase of more than 41,000 in the membership of various boys' and girls' agricultural clubs conducted by the State Agricultural Colleges and the Department of Agriculture in the northern and western states. At the close of the fiscal year ending June 30, 1914, there were 110,077 members in the various club projects in the 33 states covered by this work. At the close of the present fiscal year, June 30, 1915, the membership was 151,194, exclusive of the enrollment in the mother-daughter canning clubs.

This work is being carried on co-operatively in 26 of the 33 states in the northern, central and western territory by the Department of Agriculture and the extension departments of the state colleges of agriculture. In practically every state short courses for boys and girls and special demonstration schools have been held at the colleges and in the field.

During the past year 1,557 club members attended the mid-winter courses at the colleges, 968 of these having their expenses paid by local contributions as a recognition of their achievements in club work. Of the 38 club members who, as champions in their states, districts, or counties for 1914, have become recognized at National All-Star Club members, 31 are now attending high schools, agricultural or other colleges; 3 of the remaining 7 have

already graduated from high school, and one will go to an agricultural college this fall.

Experience has shown that the work in the boys' and girls' clubs can be carried on with even greater success without the aid of large cash prizes and awards. The net profits from the work itself have been found to be the best possible incentive. The members have their attention directed to problems of farm and home management, crop rotation and soil building, and in practically every state in which the work is being carried on a large number of club members are now working out three and four-year rotations of crops. The profits which they derive from club work they are spending on getting an education, or for purchase of pure bred stock and labor-saving machinery. Many are even buying land and thus acquiring an invaluable sense of dignity and independence.

In the canning work, 938 public demonstrations were held during the year, with a total attendance of 118,367. These demonstrations were held primarily for the club members, but parents were always invited and, as a matter of fact, more than half of those present were grown men and women. One of the great advantages of this club work, indeed, is the fact that it serves to stimulate the parents as well as the children.

## HERE IS SOME DANISH "COW SENSE"

DAIRYING is a many-sided and complex branch of agriculture, yet the principles of good milk production can be set forth in a small space. In Denmark, where dairying is the principal occupation, these principles have been so set forth by the Royal Danish Co-Operative Society, one of the most wonderful associations in the world.

Agricultural co-operation is at its height in Denmark, and the central society exerts large influence over the major farming operations of the whole country. Especially in dairying is co-operation a force in Denmark and the country co-operative creameries have been studied and imitated by men in many other lands. The co-operative society insists that farmers and farm hands on dairy farms shall learn the following rules:

1. The cow is a living machine.
  - (a) Kindly treatment entails less labor and gives more milk.
2. Good work improves the living machine.
  - (a) Milk clean. Clean milking develops the udder and increases the quantity of milk.
  - (b) Remember that the milk last drawn is by far the most valuable.
3. Cleanly milking.
  - (a) You should wear tidy and clean clothes.
  - (b) Have the milk pail clean, as well as the creamery can.

- (c) Thoroughly clean the udder by rubbing with a piece of linen.
  - (d) Wash the hands thoroughly before milking.
  - (e) Let the udder be quite dry before you begin milking.
4. Carry out the work properly.
  - (a) Milk with dry hands.
  - (b) Seize the teats with the whole hand.
  - (c) Keep a gentle pressure on the udder.
  - (d) Milk as fast as you can and never cease working until the milk is wholly drawn.
  - (e) Don't strain the teat beyond its natural length.
  - (f) Remember the value of the last drops.
5. Healthy state of the udder.
  - (a) If there be soreness or lumps in the udder or teats, stoppage in the milk canal, or unnaturally colored milk, don't mix the milk with any other, and don't send to the creamery.
6. Milking times.
  - (a) Begin milking always at fixed times.
  - (b) Milk the same cows in the same order.
7. Regard this excellent work as one of honor. Then there follow three general directions:
  1. Clean the cows.
  2. Have good air in the stalls.
  3. Light should be admitted freely.

## USE STEEL RODS IN SETTING CANVAS DAMS

IN setting canvas dams the aid of steel rods saves labor and ditch banks. This plan has been tried out by ranchers near Fort Collins, Colo.

Their water is applied in heads of three and four feet per second from ditches three feet and more deep, and no soil is dug from field or banks to weight the laps of the canvas. The irrigators find the dams are much easier set and lifted and are more stable than when set the old, laborious way.

The rods may be made of round half-inch steel, which costs  $3\frac{1}{2}$ c a pound, about six cents for a four-foot rod, or preferably of broken hayrake teeth, which are stronger, lighter and cheaper. The teeth may be hammered straight when mildly heated, and effectively welded by lapping the ends an inch or more. They are of self-tempered steel and are not seriously weakened in mending. They should be shaped like the end-gate wagon-bed rods, sharpened and slightly longer than the ditch is deep.

Fix some large eye-screws into the back side of the dam pole and stick a rod through each eye and down to the rear and under the bagging part of the canvas. The rods are placed from six to ten inches apart, depending on the depth of the ditch. Sew strong cloth loops to either front corner of the canvas and through each loop press one of the rods, leaning them up stream and thus pin the canvas lap to the bottom of the ditch.

### OREGON GUSHER STARTS BOOM

An artesian well with a capacity of between two hundred and fifty and three hundred gallons per minute was brought in recently by the drill of W. D. Newlon on the R. B. Rice place between Lexington and Stanfield, Ore., at a depth of 607 feet. The well is capable of irrigating over two hundred acres

of land, and its success is expected to be the signal for the greatest development in irrigation which Eastern Oregon has ever seen. Thousands of acres of land which have gone begging at \$10.00 to \$15.00 per acre in the immediate vicinity of the well cannot be bought for many times that price now, and for the time being owners do not care to sell at any price.

### TO HOLD MARKET CONFERENCE

The Third National Conference on Marketing and Farm Credits will be held in Chicago, Nov. 29 to Dec. 2. This conference, while providing opportunity for discussion of all phases of agricultural development and organization, is intended chiefly to secure the framing of one or two bills to be presented to congress at its coming session. It is believed that by bringing representatives of the National Farmers' Union, the National Grange, state branches of the American Society of Equity and the National Council of Farmers' Co-operative Associations into one body where they can meet and discuss the various phases of proposed legislation with representatives of the American Bankers' Associations, the Farm Mortgage Bankers' Associations and the joint committee on rural credits of the United States Senate and House of Representatives, the short cut to immediate action will have been taken.

The silo yields greater returns in proportion to cost than any other building on the farm. Let's build a silo.

Straight garden or orchard rows give a better appearance and are easier to cultivate.

## NEWS NUGGETS ABOUT IRRIGATION PROJECTS

### Idaho

The Idaho irrigation and drainage code commission, after extensive investigation, has recommended reducing the irrigable area of the Idaho Irrigation Company project in Blaine, Lincoln and Gooding counties from 150,153 acres of Carey act land to 90,000 acres. It also recommends stopping the sale of any more land in the project, as it is claimed in the present condition the project system cannot irrigate more than 40,000 acres.

The commission also recommends that the Twin Falls-Salmon River project be reduced from 73,348 to 26,000 acres. Such a reduction will leave many settlers without water.

The commission offers several plans for handling the King Hill project, which the state took over and on which it has already spent \$67,000.

The Idaho supreme court has held,

in the case of the City of Twin Falls against the Twin Falls Waterworks Company, that a municipality cannot force the covering of an irrigation canal for the safety of citizens by passing an ordinance declaring such a ditch a nuisance.

The Idaho state land board looks with favor on the proposal of the Wickahoney Land & Irrigation Company to take over the affairs of the Bruneau Irrigation Company and complete an irrigation project for the irrigation of 30,000 acres of rich agricultural lands located in Owyhee county along the Bruneau river and the Wickahoney and Jacks creeks.

David Miller, a representative of the Thayer-Moore Company of Kansas City, appeared on behalf of that financial concern, one of the largest in the middle west, and stated that his company was prepared to furnish the financial backing for the project,

or \$750,000, which will be required to install the canal and reservoir system.

### Nebraska

A \$2,000,000 irrigation project to increase the productivity of Gosper, Phelps and Kearney counties by \$3,000,000 a year was laid before congressmen and senators of Nebraska at a huge meeting in Holdrege, Oct. 21, in which 9,000 land owners participated.

The organization, known as the Tri-County Irrigation Project, with C. W. McConaughty of Holdrege as president, asked the national representatives to bring before congress a plan to develop the region.

Water will be taken from a proposed dam in the Platte river, according to the plan, so that the rainfall will be supplemented with an acre-foot of water during the irrigation closed season, from October until



April, according to State Engineer Johnson.

#### Texas

A special meeting was held by the Texas Board of Engineers at Bay City on Nov. 3 for the purpose of hearing rice growers and irrigators on a proposition for the use of more water from the lower Colorado river in irrigation.

Donna Irrigation District No. 1, of Hidalgo county, Texas, has prepared to build eleven miles of main canal, twenty-three miles of laterals and will install a large pump and engine. The system will irrigate 40,000 acres and will cost about \$215,000. The district recently voted a \$750,000 bond issue.

Foreclosure of \$150,000 bonds of the Harlingen Land & Water Company of Texas is asked in a suit filed in the eightieth district court by H. Masterson of Houston and E. F. and W. J. Madden of Hays City, Kan. The foreclosure is asked against 12,100 acres of land in Hidalgo county, which, it is claimed, is security for the bonds.

The defendant company defaulted in the interest payments on the bonds in September, 1914, according to the petition. Should the land not bring \$150,000 at public sale, the plaintiffs ask execution against some of the defendant company's property at Harlingen.

Some claim of title to the land is also being made by the Bankers Trust Company and also the Rio Grande Valley Company. Plaintiffs ask that their claim be given priority.

Preliminary work and surveys are completed for the construction of a system to irrigate 100,000 to 150,000 acres in the Colorado river valley of Texas around Ballinger.

#### Wyoming

The Hawk Springs Development Company has signed a contract with the State of Wyoming to irrigate 10,000 acres under the Carey act in Goshen county.

Final abandonment of the plan to take up the work which has been started by the old Wyoming Central Irrigation project in reclaiming by units of 20,000 acres each fully 250,000 acres of land in the vicinity of Riverton was announced before the state land board. The statement that there would be no further attempt to finance a company to continue the work was made by former Governor Bryant B. Brooks of Casper, Mayor J. A. Delfelder of Riverton, P. J. O'Connor of Casper, and John Morton of Douglas. Too rigid restrictions on the part of the federal government were the reasons assigned by the Wyoming capitalists for giving up the work.

#### California

C. D. Frisby, chief engineer of the Laguno Water Company, operating in the Imperial valley of California, is preparing data to show that there is

no shortage of water in the Colorado river and that if managed properly it will furnish, in addition to the amount it is producing, enough to irrigate the 200,000 acres the company is planning to put under irrigation.

Waste lands around San Diego, Cal., owned by the city, may be developed by irrigation. It is planned to lease the 8,000 or more acres in small tracts to citizens and such a plan, it is figured, will net the city from \$100,000 to \$200,000 in annual rental, as well as providing good homes for many of the poorer citizens.

Settlers on the Sacramento Valley Irrigation Company's project, owning water stock in the Sacramento Valley Canal Company, subsidiary of the irrigation concern, will hold stock in a public service and not a mutual company when the affairs of the irrigation company are readjusted following the disposal of the property at the coming foreclosure sale. Under the proposed settlement each settler on the project will stand in exactly the same position as if the Sacramento Valley Irrigation Company had carried out its contract of purchase except that

he will be required to pay for his water at the rates fixed by the railroad commission instead of the terms fixed in his water right contract.

Farmers around Tracy, Cal., are organizing an irrigation district to water 11,500 acres at a cost of \$28,500.

Reclamation of 60,000 acres of land in Riverside county, Cal., forty miles north of Blythe, by irrigation, is proposed by a company of which J. E. Ludy, of Blythe, is chief engineer.

For the purpose of teaching practical irrigation and the care of pumping machinery, the Inglewood (Cal.) Union High School has just purchased a turbine centrifugal pump from the Layne & Bowler Corporation of Los Angeles.

#### Montana

The Spokane & Eastern Trust Company and Ferris & Hardgrove, investment bankers, have just completed arrangements to take over jointly \$130,000 of 6 per cent bonds of the Glen Lake irrigated project on Tobacco Plains, Mont. The bonds will run for twenty-five years and will

## Dependable Power for Irrigation

When you buy an engine for irrigation pumping look first to the *quality*. Dependability is the all-important consideration. You can't afford to risk failure of your pumping outfit at the critical time. It will cost you less in the long run to pay what a good engine is worth.

### LAUSON AND FROST KING Kerosene Engines

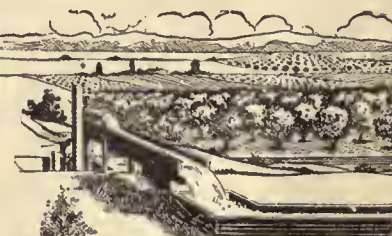
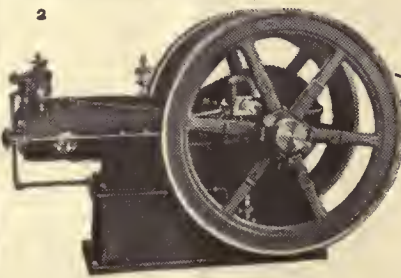


are particularly well adapted for irrigation pumping because of their absolute reliability. "Lauson" Engines are built up to a standard, not down to a price. Have more drop forged and case hardened parts than any other engine on the market and will run as true after five years use as when new.

By using a carburetor of special design, ordinary kerosene distillate is used, securing the full rated H. P. as with gasoline. The Cold Process type of carburetor is used because it is cleaner and more efficient than the oil heating system used by others.

For continuous, heavy work there is no engine on the market today that equals the Lauson. We'll be glad to submit *proof* without obligating you in any way.

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provide funds for irrigating 4,500 acres, the first unit of the 15,000-acre project.

With the organization of the Billings Bench Water Users Association, final steps were taken in the transfer of the entire irrigating system of the Billings Land & Irrigation Company to the settlers to which it supplies water. The deal is by far the most important consummated in eastern Montana this year, it is declared. The new association, to be incorporated at once, possesses a capital stock of \$600,000, divided into 30,000 shares of a par value of \$20 each. The irrigation system and the lands under it are valued at \$2,500,000.

#### Washington

Farmers around Grant Orchards, Wash., have organized to construct a \$75,000 irrigation system.

The Horse Heaven irrigation district of Washington has perfected its organization. Directors Ira Carter, W. A. Kelso and J. W. Sumner quali-

fied and elected Mr. Carter president. C. W. Fristoe, county attorney, was chosen secretary. Provisions were made to protect the water rights that the district expects to hold on the Klickitat river. These rights were formerly claimed by the Klickitat Irrigation & Power Company.

The driest spot in western Washington—around Sequim—is to be irri-

gated. A 5,000-acre district is being organized. The rainfall at Sequim is only 20 inches, although located in the middle of the district where the average is 60 inches and above.

#### Oregon

The Oregon Desert Land Board has granted the request of the Portland Irrigation Company for the right to increase the lien on the lands in the

## Federal Water Users!

Congress meets next month. Your problems must now come before Congress directly, because Congress now fixes appropriations for each project. You have other problems which Congress must consider. The IRRIGATION AGE will keep you informed on what Congress is doing. You should read it. Send in your subscription. The Age is fighting your battle.

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A series of parallel pipe about 50 ft. apart and of any desired length, each line supported by posts every 15 to 20 ft., fitted with Silver Stream Nozzles inserted in a row about 3 ft. apart. These nozzles throw a series of thin parallel streams which break into a mist before settling on to the ground. Each stream reaches from 25 to 30 ft. on either side of the sprinkling line. To cover the whole area within reach, the pipe must be turned occasionally, thereby changing the direction of the stream. This is done by means of a hand-



operated fitting which forms a part of the Skinner System devices, or it can be done by automatic equipment manufactured by us.

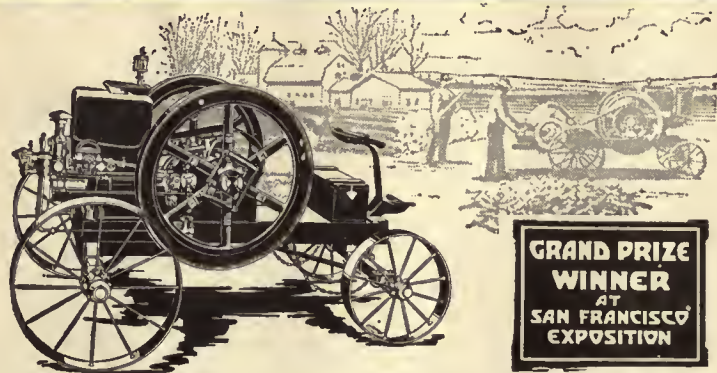
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Paisley project from \$46 to \$68 an acre on the 7,050 acres of unsold lands in the project. This is an average of \$60 an acre for the entire project, comprising 12,000 acres. In consideration of the increase of lien allowed, and also for an extension of the company's contract in which to complete the work to Sept. 11, 1917, which the board granted, the company will be required to increase the storage capacity of the reservoir under construction. This will necessitate increasing the height of the dam. Until the water rights on the project are adjudicated, the board ordered that no more lands be sold.

State Engineer Lewis of Oregon has announced that during the three months ending July 31 he had issued 152 permits for the appropriation of water, under which it is proposed to irrigate 23,143 acres of land. Construction of 210 miles of canals and pipe lines at an estimated expenditure of \$891,242 will be required by these permits. Fifteen reservoirs are to be built at an estimated cost of \$573,800.

With the granting of a franchise by the town of Phoenix, Ore., to the Rogue River Canal Company, construction work on the irrigation system south of Medford will begin. Water for more than 1,000 acres of orchard land is assured for 1916.

To build new drainage works on the Klamath irrigation project in Oregon, the secretary of the interior has added \$12.50 an acre to the cost of that project, with the consent of the majority of water users. Those voluntarily subscribing to this increase will meet the additional payment under the reclamation extension act. Those who did not subscribe will have \$1.25 an acre added to their annual operation payments for a period of ten years beginning March, 1917.

#### Colorado

A new Colorado irrigation company, with a capitalization of \$201,875, representing the reorganization of several old companies, has been incorporated under the name of the Butte Valley Ditch and Reservoir Company. The incorporators are Miles G. Saunders, E. F. Chambers, both of Pueblo, and George Dick, of Walsenburg.

The articles state that the company owns the property formerly known as the Orlando Ditch and Reservoir Company, also the ditches and reservoirs of the Greasewood arroya and the Schoolhouse arroya, irrigation systems and the reservoirs known as Orlando No. 2 and Orlando No. 3. The capital stock is represented by 4,750 shares, valued at \$42.50 a share.

The directors of the company for the ensuing year are J. N. Johnson of Chicago, George Dick of Walsenburg and William Olsen.

The Turkey Creek Irrigation Company of Colorado has filed articles of incorporation. The company is incorporated for \$100,000 and the incorporators are J. C. Teller, E. C. Teller and H. E. Brayton. The company owns water rights in Turkey creek.

A contract for the construction of

the Apishapa Consolidated Irrigation system in Colorado, at a cost of \$375,000, has been let. The concern represents a consolidation of old Omer district and the Van Skike ditch, a part of which is in Las Animas county. The new system will be in Pueblo and Otero counties.

# Alfalfa for profit

**"One-Half the Alfalfa Seed Sown is Wasted Every Year"**

This statement has been made by many recognized Alfalfa experts—men who know what they are talking about.

**They say that they secured better stands of Alfalfa with 10 lbs. of seed, drilled with the Superior Special Grass Seed Drill than with 20 lbs. of seed sown broadcast.**



THE SUPERIOR 20 X 4 SPECIAL ALFALFA AND GRASS SEED DRILL

There are 20 discs on this machine set 4 inches apart. The construction is such that all the seed is sown at an even depth, and an equal amount of seed in every furrow.

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REJUVENATES OLD ALFALFA FIELDS

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## USE CLEAN STRAW AS MULCH

By E.F. McKune,  
Colorado Agricultural College, Fort Collins, Colorado

The object of mulching strawberries in the fall is to prevent winter-killing.

Winter-killing is usually caused by the plants dying out too much during the winter months, or by alternate freezing and thawing.

The best mulch material to use is clean straw; this is placed on the plants 4 to 6 inches deep after the ground has been frozen.

In the spring, after the ground is thawed, the straw is worked around the plants. This serves several purposes, such as keeping the patch free from weeds, conserving the moisture and forming a clean mat for the berries to ripen on.

After the fruit has ripened the straw should be removed.

## RESUME BIG JOB IN MEXICO

Preparations are being made by the Richardson Construction Company of Los Angeles, Cal., to resume on an extensive scale the work of constructing its big irrigation enterprise in the valley of the Yaqui river, in the southern part of the state of Sonora. This project involves the reclamation of about eight hundred thousand acres of land. The water supply will be obtained from the Yaqui river by means of a dam and storage reservoir.

## \$10,948,834 FOR U. S. PROJECTS

The Reclamation Service has allotted \$10,948,834 for work on government irrigation projects from July 1, 1915, to June 30, 1916. These sums are slightly less than the congressional appropriations.

## WHY BEET YIELD IS LOW

Among the causes for low yields of sugar beets the greatest single source of loss has been found by government investigators to be improper thinning.

Unless properly supervised, laborers invariably leave too great space between plants. Other causes for light stands and low yields are poor preparation of the seed bed, improper operation of seed drills, late frosts, the damping-off disease or the ravages of such pests as flea beetles, cut and wire worms.

These long evenings are good times to plan next year's garden and to study better methods.

## How to Get More Wear Out of

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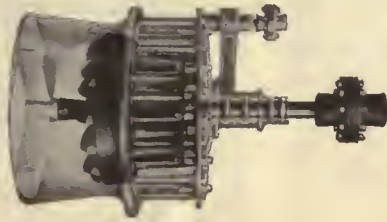
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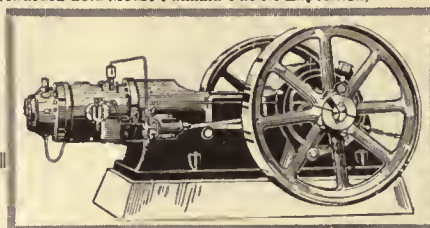
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Won't it discourage YOUR boy to pump water by hand, especially when the man across the way is handling it with scientific power? Won't it discourage him just as much to spread manure by hand? Won't your son build up mentally as well as physically and see big-

ger and better and nobler things if he has a chance to use his head as well as his hands? Ask yourself these questions and let us help you to solve them.

Of all examples of useless farm toil, the most unwise, from all viewpoints, is that of SPREADING MANURE BY HAND. You can pump by hand and eventually get results, or milk by hand and get your large cream check, but you can't spread manure by hand and get your money's worth from the next crop.

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Thirtieth Year

# THE IRRIGATION AGE

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No. 2

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pioneer publication of its class in the world.

### Interest and Rural Credits

Figures that will throw light on the charges paid by farmers for personal or collateral security in various parts of the United States were given out by Carl W. Thompson, specialist in rural organization, United States Department of Agriculture, in his address before the third national conference on marketing and farm credits, in session at the Hotel Sherman, Chicago, November 29 to December 2.

Prof. Thompson also pointed out the factors that cause variations in these charges. He showed the relations of existing banks of this class of farm loans and considered certain matters with regard to this class of rural securities.

The average total cost, says Prof. Thompson, including interest and extra charges, varies from  $6\frac{1}{2}$  per cent in New England to between 10 and 20 per cent in the Southern or Rocky Mountain states, and he declared this to be the result of figures obtained by the office of markets and rural organization of the United States Department of Agriculture. He further stated that in those states of New England where the total cost is lowest (about  $6\frac{1}{2}$  per cent) the extra charge on the average is only about  $\frac{1}{2}$  to 1 per cent; in the more highly developed

farming regions of the corn belt, where total costs range between 7 and 8 per cent on personal and collateral loans, the average extra cost is less than 1 per cent. In those states of the South and West that have the highest average for total costs the average extra charge often ranges between  $2\frac{1}{2}$  and  $3\frac{1}{2}$  per cent. Similar variations are also found within many states.

In eastern Nebraska, so states the professor, the average total cost for such loans is 8.3 per cent, while in western Nebraska it reaches 10.6 per cent, illustrating contrasts in interest rates that generally obtain as between the relatively highly developed agricultural areas with abundant rainfall and the semi-arid farther west, and emphasizing the importance of climatic conditions as one factor affecting interest rates. Prof. Thompson also tells us that no factor affecting interest charges is of greater importance than the method and system of farming. The best credit will always tend to go to those farming regions having safe and regular incomes from year to year.

Preference in credit, it appears, will be given where population is fairly stable rather than shifting, and another important feature to all farmers is

that it tends toward sections where farming is conducted by owners rather than tenants.

These thoughts are presented to our readers as preliminary to a series of articles on rural credits that will appear in future issues of *THE IRRIGATION AGE*.

**Lane's  
Ruling  
Hits Desert  
Settlement**

Western states are up arms against Secretary of the Interior Lane's recent ruling on desert land entries. Just read it:

"Applicants to make entry under the desert land laws should be made clearly to understand that where a water supply is made available for irrigation purposes by means of a pumping plant, such plant must be of a capacity to make available at the time of final proof a sufficient supply of water to irrigate all irrigable land embraced in particular entry."

Unless this ruling can be withdrawn the people of the west might just as well quit trying to take up land under the desert act in many localities where water for irrigation is available only by pumping. The requirements of the government are almost, if not, prohibitive. It is stated that a second foot flow for twenty-four hours is required for 100 acres. This means a capacity of approximately 650,000 gallons of water pumped per day for each 100 acres of land entered.

**Keep the  
Farm Boys  
on the  
Farms**

The town boy does not get into successful farming as readily nor as quickly as the farm-bred boy can. It would be strange if he did.

Quite a large number of town boys are taking up the courses in agriculture at the agricultural schools and colleges, and some of these have had no farm training whatever. While it is possible for them to become real farmers, it is also probable that they will have some hard sledding before they get safely past the "tenderfoot" stage.

The farm boys beat them at every kind of practical work, and it is often seen that these urban students of farming are the despair of their teachers at the agricultural schools because they seem to take hold of everything "wrong end to," from the way they lead a horse up to the wagon tongue to the way they catch a hen. In spite of this, these boys make good.

A man who never has taught a calf to drink, nor broken a colt, nor even learned to milk eight or ten cows twice a day for a year, does not start in on an even footing with the boys who have mastered these and a hundred other tasks of ordinary practical farm

life. We can read and apparently master the manner of planting a tree, ringing a lot of shoats, or hiving a swarm of bees. But he who thinks he knows will be likely to make a sad mess of things the first time he tries to do the work. Nevertheless, these men succeed. The best plan, however, is to make it profitable for good farmers to stay where they are.

If our solid sensible farm boys, who have already had a most valuable apprenticeship in the best business, trade or profession in the world, can be made to constitute the greater number of students at our agricultural schools, it will be the best possible plan for all concerned.

**Remember!  
We Are  
All  
Brothers!**

Roger W. Babson, leading business expert and commercial statistician, talked to a large audience of Chicago business men the other day. He made some remarkable statements and predictions about the European war, based largely on the science of business mathematics.

Buried down near the conclusion of his address was a little sermon on a big subject—cooperation. Every American, particularly the farmers, should study this Babson sermon. Here it is:

"The idea that one concern, or one city, or one country can benefit by the misfortunes of another is an economic fallacy. Whatever one merchant or one city, or one nation loses must be spread out over the entire industry, country or world. In business and commercial life the Europeans have already learned this and the cooperative movements in Europe are far in advance of what they are in this country. The war will result in welding our competitors together more closely and only by developing a better spirit of cooperation in this country between competing manufacturers, between labor and capital, and between different sections of the country, can we hold our own with Europe after the war is over. I say that such a spirit of cooperation is absolutely necessary for us to hold our own after the conflict is over.

"If we are to continue to grow after the war is over, we must even go further. Only as the war results in some formation of world organization whereby the other nations will be able to devote their wealth and energy after the war to constructive rebuilding instead of to destructive implements of warfare, will they be able to again buy of us as they have in the past. In other words, when Jesus of Nazareth taught that we are all brothers, one of another, whatever our nationality, class or business, He stated a great economic fact which must some day be recognized."



# The Federal Water Users



A Department Devoted to the  
Interests of the Farmers on the  
Government Irrigation Projects

EDITED BY GEORGE J. SCHARSCHUG

## WHY THE U. S. SHOULD INVEST IN FARMERS

By Elwood Mead Member of the Final Board on Cost Reviews of the Federal Irrigation Projects

WHOEVER acquires land and creates thereon a home renders a service to the state. Whoever makes the attempt is entitled to all the aid and consideration the state can safely extend. The general welfare is so largely dependent on having the growth of the country keep pace with the growth of the city that more than a score of enlightened democracies have made state aid and oversight of land settlement a national policy.

There are important reasons why America should be added to the list. The progress of rural development is at present not satisfactory. The balance between city and country development is not being maintained. The number of farmers in some of the richest farming sections of America is decreasing. In the western third of the country, with its vast stretches of unpeopled and unsettled land, cities and towns are growing from two to five times as fast as the rural districts on which their well-being so largely depends.

Meritorious irrigation projects are unprofitable because of limited market for the water they make available. Many settlers under these projects, after years of effort, have had to abandon their homes and lose the capital brought with them. The condition of many settlers remaining is precarious and calls for early and adequate relief.

The nation has no land settlement policy; there is no one to whom a settler can go for official disinterested advice about land values; there is no one to direct beginners in the costly and difficult work of preparing land for irrigation; there is no system of rural credits or long-time amortised payments, which are the salvation of settlers in other

developing countries. There are, on the contrary, inflated land prices; irresponsible land sellers; interest rates ranging from 6 per cent to 12 per cent (instead of  $2\frac{1}{2}$  to 5 per cent in countries where settlement has state aid); short time loans with commissions for renewals and the ever impending menace of mortgage foreclosure. If the settler works long hours, lives on scanty fare, wears poor clothes and denies himself and his family all except the bare necessities of existence, it costs from \$50 to \$100 an acre to make arid public land habitable and productive. If he lives decently, it costs more.

Men with ample capital will not subject their families to the privation of this pioneering experience. Many who do make the attempt fail for the lack of assistance which the state could safely give. As a result, the young, and ambitious who, under



Ramah irrigation reservoir in McKinley county, New Mexico.

sensible conditions, would be creating homes on the land, are either flocking to the cities or going to other countries which do have a state land policy.

There is no period in the life of a community so important as when the land is being settled. The influences exerted in these plastic years may determine its prosperity and the character of its civic ideals for all future time. Settlement should, therefore, be not left to chance, but should be under state oversight.

There should be in each state a rural department bureau which should have a record of lands available for settlement; furnish information about the fertility and productiveness of land; exercise oversight over the operations of land salesmen. The state should create a system of rural credit which will give settlers low interest rates and long time



amortised payments for the money borrowed to improve and equip their farms.

So long as the fertile lands of the middle west or the easily watered lands of the arid west were to be had under the Homestead act, there was no need for state aid, but about the beginning of this century the fertile lands were absorbed and the irrigation of arid lands had become so costly and difficult as to place it beyond the reach of individual capital or effort. This led to the passage of the Reclamation act, and to enormous investments of corporate capital in the construction of irrigation works. The settler who was to create homes on this land was not, however, dealt with as the party to be benefited. His place in the scheme was to repay the money expended.

Neither the government Reclamation act nor the plans of corporate enterprises made any provision for giving financial aid to the settler in acquiring land; or in helping him prepare it for cultivation, or to protect him from exploitations by the land speculator. The opinion has seemed to prevail that if canals were built and the water made available, settlers should fight their battles unaided and pay all the costs. Both the government and corporate enterprises gave their whole attention and invested all their money in building dams and reservoirs. The economic problems of the farmers who were to repay this investment were practically ignored. This gave to the land speculator a broad and inviting field and full use was made of its opportunities.

It is to be regretted that this great investment in irrigation works was not preceded by an economic study to determine what methods would best develop the lands these works were intended to serve. Such a study would have shown that the same need existed for money and skilled practical direction in preparing land for irrigation as there was for money and engineering skill to build canals. It would have disclosed the great cost of transforming arid lands into productive farms and would have, at the outset, brought government aid to settlers or warned those without capital to keep away. It would, almost certainly, have prevented the exploitation of settlers by speculators. There was, however, no such investigation. On the contrary, newspapers and magazines were filled with glowing accounts of the great opportunities for settlers which government and private reclamation work were opening up in the arid west. Their description of the government's operations was misleading in that it gave to the eager landseeker a belief that much of this development was to be a donation and added to the properly equipped homeseekers a great body of immigrants who lacked capital and experience and a correct understanding of the task they were attempting.

The story of what followed, when written, will be an interesting economic history. Probably, nothing has ever surpassed the wide range of activities, the fertility of imagination and the utter lack of any sense of responsibility on the part of those who sold land to these confident, credulous and inexperienced homeseekers. As the demand for land increased, the price of wheat land was inflated from \$5 to \$50 an acre, while fruit land was inflated from

ten to twenty times its original cost. Land bought for \$20 an acre was subdivided and sold for \$100 to \$250 an acre. One hundred and fifty thousand acres, bought at an average price of \$40 an acre, had its price increased by subdivision to \$75 and \$250 an acre.

In time these land prices became purely speculative; they had no relation to productive values. It was not in any sense real development. Both the state and the settler were being exploited. Nothing worse for the enduring prosperity of this part of the nation could have happened.

These increasing prices brought with them a staggering burden of interest. Land selling became a more complicated and difficult operation. It required more imagination, more eloquence and personal magnetism to sell land at \$200 an acre than had been required at an earlier date to sell the same land for \$20 an acre. The successful land salesman became an indispensable factor. The customary commission of 2½ to 5 per cent that prevails where development is of a healthy character and where values are legitimate, rose to the unbelievable figure of 25 per cent. One-quarter of the selling price of the farm went to the land-selling spider who wove the net for the settler fly.

The records of one subdivision now show that it has cost an average of \$70 an acre to sell land that was originally bought for \$35 an acre.

I have recently made a personal inspection of the lands being reclaimed and to be reclaimed under a score of irrigation works. These included both government and private enterprises. In every case one had only to look at the land, at the settler's home, at his meager and inadequate equipment, and then hear the story of hope deferred and development arrested by inadequate capital to realize what a serious venture it is for the unaided individual to attempt to reclaim wild land.

In the first place, the majority of these settlers enter on a kind of development they do not understand and a kind of agriculture whose methods and practices are all strange and new. Before they can obtain a living income from their farms they must incur large expenses not required in an unirrigated country; they must have a shelter for their families; provision must be made for a water supply for household uses; ditches must be dug, the land cleared, the surface leveled so that water will flow over it; often it must be irrigated and cultivated a year before a crop can be grown. All of this expenditure and labor is unproductive. Meantime, the settler must live, and much of his scanty capital is being swallowed up in living expenses.

If this preparatory work were done in advance of settlement, or under a scheme in which the settler is given financial aid and practical oversight after his arrival, the land would be prepared for irrigation in half the time and at half the present average expense; and if settlers could secure an adequate equipment for stocking and cultivating their farms, three-fourths of the failures which now occur would be averted. On government reclamation projects this organization and this financial aid and practical direction should be attended to by the government. On many private enterprises



it will have to be done by the state. A few hundred thousand dollars spent in building houses, in leveling land for crops, and making loans to settlers would give better results to the nation and create far better social conditions in irrigated areas than the expenditure of millions of dollars on dams and canals.

I have said that the condition of settlers under many of these works calls for relief. On one project the average indebtedness of all the settlers is \$1,000. They have exhausted their capital, reached the limit of their credit, and have no way to complete the improvement of their farms. On another, three-fourths of the settlers must lose the fruits of years of effort and all the capital spent in development if aid is not soon forthcoming. On another, 85 per cent of the farms are mortgaged and the mortgage debt averages \$50 an acre over the whole area. On another project one farm has been sold, abandoned and resold five times. There are several enterprises, government and private, where aid to settlers must be had if a wholesale exodus is to be averted. Out of hundreds of experiences of settlers obtained from personal interview I will give one, which is, however, typical of many.

This settler brought with him from Wisconsin \$2000 gathered together through years of industry and economy. He took up eighty acres of government land of which 68 acres were irrigable. He built a house at a cost of \$200 and a shed in which to keep his horses. He then bought furniture for the house, implements to cultivate and level the ground and then began the unproductive and unfamiliar labor of fencing his farm, building ditches and leveling the land for cultivation. While he worked at this the remainder of his capital was being absorbed in living expenses, and before any income could be obtained his capital was exhausted and he had no credit. A man without food will starve to death in a b o u t nine days; and he had to give up the improvement of his farm and go to work for wages to buy bread. As he expressed it, he is "dead broke and in debt." The wages he is getting only furnish a bare livelihood. He has no more prospect of keeping that farm without some financial aid from the state than I have of flying to the moon; but his two thousand dollars is there and he hates to leave it and begin life over again.

I asked another settler, whose condition was equally hopeless, why they had not presented their situation to the public and asked for some comprehensive relief. He said they called a meeting to consider it and were afraid if they did there would be no chance of selling out, and they preferred to keep still and take their chances of unloading on some other "sucker."

All of these settlers believe that if the lands were made ready for cultivation and the necessary stock and equipment, they could pay the entire cost, pay for water rights and become prosperous and contented members of the community in a few years. But until financial provision for doing this is made it is neither honest nor humane to allow poor men to settle on unimproved arid land.

The most pathetic aspect of this situation is the fact that nearly all this hardship, anxiety and waste of time and money can be averted. I say this with certainty, because of a personal knowledge of what is being accomplished through state aided development in other countries. I was for nearly eight years a member of a commission that had charge of government aid in irrigation settlement in an Australian state.

I accompanied the land minister in an investigation of state-aided development in Italy, Denmark and Ireland, and saw in every case a return of the people to the land, a contentment and a prosperity that had never before been known and a new birth of patriotism and affection for the state because of gratitude for the service which it had rendered.

When I went to Australia conditions there were almost a direct counterpart of those now confronting irrigation enterprises in this country. Costly works had been built, but the land was not being irrigated nor the water being used. The number of farmers on irrigated areas was decreasing. Men who were without any capital could not buy the land and those with capital did not care to. The government determined to change this. It began an investigation to determine what the government ought to do and could safely attempt. In other

w o r d s, land settlement was studied from the standpoint of public welfare rather than from the standpoint of profit from land sales.

This preliminary study of the situation showed t h a t the success of a settler largely depends on two

things: First, obtaining a living income from his farm within a year; and, second, getting the whole of his land into cultivation and production inside of two years. The state's plan of irrigation development included, therefore, building houses for settlers, leveling and seeding a part of the farms, the placing of a practical farm instructor over every area of 20,000 acres or less and the lending of money to the settler to complete the development. In all this the public was amply protected. While the settler was only required to pay a deposit of 3 per cent on the land and was given 36½ years' time in which to complete payments, he paid a 40 per cent deposit of the cost of nearly all improvements and was only loaned up to 60 per cent of the value of improvements made by himself.

I am quite sure that if those in charge of irri-



One of the artesian wells used for irrigating in McKinley county, New Mexico.



gation development in this country could visit one of the Australian districts and see what it means to a settler to go into a new and comfortable home, to take possession of fields from which, in many instances, a living income was obtained within thirty days after settlement, and look over the financial records of the government and see how this is being carried out without expense to the general tax payer, it would mean an immediate end to the haphazard, unaided, wasteful and costly policy that is now being followed here.

As year after year I saw the settlement extend and show as much progress in a year as it, as a rule, made here in five years, the desire and the longing grew within me to return to my own country and do all that lay within my power to help establish here the system that is doing so much for rural developments in other lands.

I believe that the time has arrived for this country to change its methods and that public opinion is favorable to such change. The great intellect of Secretary Lane is united to a broad, human sympathy and understanding, and his spirit is reflected in the present administration of the Reclamation act. We have in our agricultural colleges and experiment stations a body of trained, expert advisers such as are available in few other countries.

One of the most gratifying experiences I have had since my return is, however, to find in California an exhibition of its old and lovely spirit of hospitality to the stranger within its gates and a demonstration of the feasibility and value of organized aid and direction in settlement. It owes its existence not to the conscience and wisdom of the public, but to the sagacity and humanity of an individual. The pioneer in scientific land settlement in California is Dr. George Dwinnell of Siskiyou county. He is building houses, leveling and planting part of the farm, providing the needed equipment of tools and livestock, giving the settler time to get on his feet before requiring repayment, and is building up a community with right social conditions and enabling families to enjoy landed independence who could never pay for it if left to begin their struggle unaided.

The best part of his work is that it pays in money, although he did not undertake it for profit.

The experience of Dr. Dwinnell shows that here, as in other countries, capital and organization are needed in the preparation of irrigable areas for settlement, and not only pays in money, but in social conditions.

What Dr. Dwinnell is doing, what has been done in British and German South Africa and Australia, can be done in America. That is the view of a parliamentary commission of our near neighbor, British Columbia. This commission, after an investigation of rural credits and land settlement in this country, Europe and Australasia, have recommended the adoption in their province of the Australian system, and a bill appropriating fifteen million dollars to inaugurate this system is now before their parliament.

The report of the British Columbian commission ought to be widely read in this country. It says: "The system has not only increased the output of farms, given a great impulse to the agricul-

tural industry, but has reacted on other industries and stimulated trade.

"With money available on terms suitable to the industry, the farmers have built better houses or remodeled their old ones; brought a large acreage of land under cultivation that would otherwise be lying idle; have bought and kept better livestock; have bought and used more labor-saving machinery on the farms and in the houses; have erected elevated tanks and windmills; \* \* \* They keep more sheep and pigs and have so largely increased the revenue from their farms that they are able to meet the payments on the mortgages and to adopt a higher standard of living and a better one. Throughout the country a higher and better civilization is gradually being evolved."

State aid and control in settlement, if adopted, must be, however, on business principles. Aid should only be extended to actual settlers and to those equipped in experience and character to succeed. There should be no donations of money. Loans should be secured by liens on the land and improvements and the interest rate should be high enough to make the system entirely self-supporting. It can do this and still be of immeasurable benefit to settlers and to the state.

To those who are fearful that the adoption of this system would mean loss which the public would have to assume, I would say that this will not occur, unless as a nation we are less capable and less honest than the countries that have adopted it. The remarkable fact is that in not a single country has the system failed to pay its way.

In New Zealand the accumulated profits amount to \$1,500,000. In Denmark, where the loans go up to 90 per cent of the value of improvements, there has been no loss. In Australia, where \$232,373,200 has been loaned, there is not one among the 777 members of the eight parliaments concerned who is not an ardent supporter of the system.

In the Australian state where I lived, out of over seven thousand repayments due in 1912, only ten farmers were in arrears and those arrears aggregated only \$468.

To the objection that such aid would be paternalism, I would reply that it is no more paternalism than the Homestead act or River and Harbor Improvements or the Postal service. Of all governments, democracies should be the ones most capable of performing and willing to perform any direct service for the people which the public welfare requires.

Relief and protection for the settler is both a national duty and an opportunity. I hope that the Reclamation Service may be given money and authority to relieve its struggling settlers. I hope that the State Rural Credit act, introduced in the last legislature of California, may become a law in the next one.

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Is the entrance to your home attractive? Things that are always noticed in the country are entrances to farmsteads. These should at least be clean, orderly and well laid out. The lawn is more pleasing if it is kept clipped and if it contains a few shrubs and trees.



## 17 STATES TO BACK JONES IRRIGATION BILL

SENATOR WESLEY L. JONES' pending bill for federal guarantee for irrigation and drainage district bonds is expected to have the solid backing of seventeen Western states in the new Congress which convenes this month.

A convention to discuss this bill and other legislation to aid land settlement and the farmer will meet in San Francisco, Dec. 2 and 3. The meeting was called by the Washington State Reclamation Conference, which endorsed Senator Jones' bill. It is proposed to hold a later convention embracing all the states. The purposes of the San Francisco meeting are outlined in the following letter sent to governors and various organizations and the subjoined resolutions of the Washington conference:

"Recognizing the pressing need of broader and more liberal national legislation with respect to that class of agricultural development, which is dependent upon large initial expenditures for irrigation or drainage works, and, particularly, for the purpose of urging upon the forthcoming Congress, the passage of the Jones Bill (S 6827) or

some bill of similar import, a Western States Convention will assemble and hold sessions in Convention Hall of the Panama Pacific Exposition at San Francisco on December 2 and 3, 1915.

"The convention is called at the instance of the Washington State Reclamation Conference, which has just completed its sessions in Seattle, and as indicative of the sentiments and aspirations of that conference, a copy of the resolutions unanimously passed at its final session, together with a copy of the Jones bill, is herewith enclosed.

"The San Francisco Convention has the cordial endorsement of the Honorable Ernest Lister, governor of Washington, as will be noted from the following excerpts from his letter to us:

"One of the greatest problems affecting the West the federal government now has before it is that relating to the further development of irrigation projects and bringing under cultivation, by

irrigation, large areas of land practically valueless at the present time. I hope the congress to be held in San Francisco, consisting, as I understand it, of delegates from all of the states interested in irrigation matters, will be successful and that some plan or plans may be formulated that will be of assistance to the federal government."

"You are urgently requested to appoint delegates to this convention, in accordance with the provisions of the resolutions, to the end that there may be presented to the next congress of the United States a united, effective and unmistakable demand for legislation of the character above outlined. Appoint your delegates promptly and see that they have proper credentials. Send notice and reply to

the chairman at headquarters, Palace Hotel, San Francisco."

The resolutions adopted by the Washington State Reclamation Conference at Seattle on Nov. 16, follows:

Pursuant to a call for a meeting of delegates representing the various irrigation projects and districts of the State of Washington which convened in session on this 16th day of November, A. D. 1915, at Seattle,

Washington, with some fifty (50) members present, having particularly in view the discussion of the Jones bill, being Senate No. 6827, and after discussion and deliberation and having a general consensus of opinion, it was resolved, as follows:

First: That the delegates assembled do form themselves into a body to be known as "The State Reclamation Conference," which name may be subject to change at any future meeting.

Second: That we declare ourselves in favor of the principle involved in the Jones bill aforesaid, and pledge our best endeavors and efforts to help secure the enactment thereof, with such needful amendments or alterations as may be deemed advisable as the question may be debated and evolved.

Third: That we recommend the calling of a convention or conference of representatives from the states of California, Oregon, Washington, Idaho, Montana, Nevada, Arizona, Utah, Colorado, Wyo-



Here's a San Joaquin valley, California, man with a fig tree big enough for several families. Courtesy of The Earth.



ming, Kansas, Nebraska, North Dakota, South Dakota, Texas Oklahoma and New Mexico and when the convention shall so convene we further recommend that action be taken there by which the body thus formed shall organize itself into national organization that shall provide for a convention or conference later to be held at some eastern point in the United States, in which shall be embraced delegates from every state in the Union. That the date for which this convention shall be called shall be the second day of December, 1915, and remain in session two days, and the place of meeting shall be at the convention hall on the fair grounds.

Fourth: That the basis of representation in the convention or conference of the delegates shall be:

a. Three from each irrigation district or project.

b. The secretary of the interior, and such assistants as he may desire to nominate.

c. The governor of each state, and such other state officers as may desire to be present.

d. Three delegates at large from each state, to be nominated and appointed by the governor thereof.

e. One from each chamber of commerce or other commercial organization.

f. One from each clearing house organization.

g. Three representatives of each of the railway systems operating in the districts embraced above, to be named by the president thereof.

h. One delegate from each labor council.

i. One from each engineering society.

Fifth: That a committee of five be appointed by this organization to have full charge of issuing the call, and make all plans and arrangements for procuring an effective organization, and complete all plans for calling the convention, with all power necessary to carry the obligations of this organization to full force and effect.

Sixth: That we strongly endorse the codification and enactment of the irrigation laws of the state, as recommended by the commission appointed by the governor.

## MAKE IRRIGATION BONDS PURE GOLD

From the Rocky Mountain News, Denver, Colo.

IN a multitude of counsellors there is safety. Something safe and of practical moment to the Rocky Mountain region, of which this city is the radiating center, should come from such a conference or commission as has been proposed by Ex-President Case of the National Irrigation Congress. He would have representatives from this congress and the International Farm Congress which met in Denver, meet with representatives of the Investment Bankers' Association of America, and men chosen by the federal and state governments, to devise plans of development for Western lands.

There is work cut out already for such a gathering that would have in its membership practical bankers, irrigation engineers and farmers, together with administration men who have made a study of Western land conditions.

To begin at the beginning, capital is required for development and investments are not going to be made in haphazard fashion. Only of recent date has the farmer to the east of Denver been able to get from banking institutions loans on his lands in process of development. Their status for investment purposes has not been fixed. In a sense it is new industry, this scientific cultivation of land without artificial irrigation. A thorough understanding of this work and its success for years would be to the advantage of capital as well as of farming. The risk is no greater than in long recognized farming territory in Middle Western states.

In almost all of the states in this region irrigation is being hampered, and in many instances is at a standstill, on account of blunders and worse committed and permitted largely by ignorance. Colorado is no exception. Exploiters and promoters have done serious injury to irrigation. And, sad to relate, the states as such have done nothing of consequence to stop this practice.

Such a commission or conference as has been suggested could be of distinct advantage in drafting legislation that would put irrigation and irrigation securities on a safe and recognized basis. If a state engineer or some responsible officer were required to pass on and give consent to all irrigation undertakings that appealed to the public for support, there would be a halt on wildcat irrigation schemes in these states. In no time irrigation bonds would be accepted by conservative bankers, and meritorious projects for water conservation and land development would be under way again. Now it is the practice in Eastern houses to place good and bad in one waste basket.

The Federal Reclamation Service and representatives of the states could come together and with the advice of men from these congresses agree upon a line of demarcation. It is true a great deal of friction that prevailed immediately following the organization of the Service has been removed in recent times, but not all. Legitimate projects in this state and other states to the west are waiting a solution of the question of a state's right to water within its boundaries when that water is claimed by another state or by the federal service for interstate reclamation.

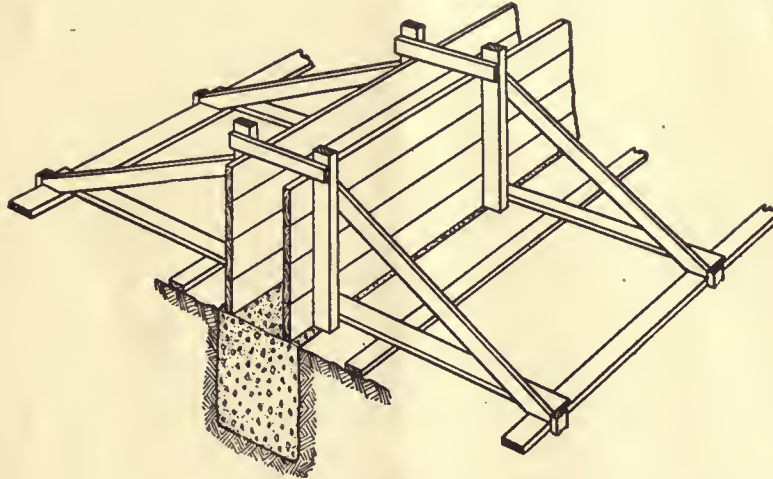
At a gathering representative of the public land states the question of further extension of federal reclamation and the work that would be of widest benefit could be dealt with by federal and state representatives.

A great deal must be gained by having the best brains in the Western country coming together for mutual benefit and agreement on a broad policy reaching to Congress and dealing with the conservation measures that are to be up for debate and passage this winter.

## HOW TO BUILD CONCRETE WALLS ON FARM

CONCRETE walls are easily constructed and at low cost. These walls are especially suitable for farm entrances or enclosures about farm buildings. Where merely serving the purpose of an enclosure, such as a barnyard or poultry yard, it is not necessary to construct the wall more than 6 inches thick. Simple methods of construction are as follows:

The most important consideration in the construction of any wall is a firm foundation, sufficiently deep to prevent heaving by frost. In most localities this distance is 3 to 4 feet. When the earth is firm and the sides of an excavation will stand up vertically, it is unnecessary to use wooden forms for the portion of wall beneath ground level. A trench of the required width is dug, taking care that the sides of the trench are straight, vertical and fairly smooth. The width of all walls below ground level should be at least 12 inches. Where sandy or crumbly earth is encountered, it is best to use wooden forms below ground level. In depositing the concrete in the foundation trench see that no dirt falls into it, as this would weaken the wall. The proper proportions for walls below ground are 1 bag of Portland cement to  $2\frac{1}{2}$  cubic feet of sand to 5 cubic feet of crushed rock or pebbles. When the trench is filled with concrete to ground level, a simple form, as shown in the drawing, is set in place. The surface of the foundation at ground level must be entirely free from dirt, chips or other foreign substances and the concrete roughened before depositing upon it



A simple form for the construction of concrete walls.

the above-ground portion or wall proper. The minimum thickness of walls for very light structures may be 4 inches, although it is very difficult to deposit concrete in a wall this thin. A thickness of 6 inches is better for most purposes. The proportion of walls above ground should be 1 bag of Portland cement to 2 cubic feet of sand to 4

cubic feet of crushed rock or pebbles. Bank-run gravel may be used if the pebbles are separated from the sand by screening through a  $\frac{1}{4}$  inch screen. For the above-ground portion of walls the forms should be made with care, the boards being carefully matched so that a smooth surface will be obtained in the finished wall. This result is obtained

by spading the concrete as it is being placed in the forms. Spading consists of thrusting between the form and the fresh concrete a thin wooden paddle. This serves to force the stone back into the concrete, allowing a rich mortar coat to flow against the forms. In walls above ground it is well to reinforce with small steel rods or wire mesh. This reinforcing runs in both directions and serves to prevent any cracks due to settlement or other causes.

Walls for buildings can be constructed as described, but for buildings of considerable size the thickness of the walls should be 8 inches, and one or two lengths of rods should be laid about 2 inches above the tops of windows, doors and other openings.

## COURT RULES ON SEEPAGE DITCH WATER RIGHTS

FOR the first time in the history of irrigation law in Colorado, an adjudication of seepage ditch water rights has been filed as a part of an adjudication case. This new irrigation finding has been filed by Referee W. R. Kelly in the adjudication of sixty-seven water rights in District No. 2, and will be up before Judge Perry in Denver for final action December 16.

Referee Kelly held, first, that the rights of seepage ditches may be adjudicated in general proceedings; second, that twenty years' undisputed use of

such seepage ditches gives title thereto by adverse possession, and, third, that such long continued use of such seepage water compels a court of equity to recognize same by reason of the equitable doctrine of estoppel. One of the parts of the decision is that the normal evaporation during the three months of June, July and August, from a field of 300 acres covered with seepage water, would be equivalent to a depth of three feet of water over the entire covered area, and that, therefore, such an amount of water so evaporated could be diverted by the seepage ditch



on a showing that such total area was drained by such ditch.

The proceedings were started by the Lower Latham Ditch Company, and the seepage ditch owners appeared and asked that their rights also be adjudicated.

The adjudication settled the right of priorities from the mouth of the Platte to the mouth of the Poudre, and all their tributaries except the Big Thompson, St. Vrain, Clear creek and Boulder creek. There had been no general adjudication of this district since 1883, and some of the ditches had been proved up on in 1869.

It affects the water for 125,000 acres under the Standley system, 100,000 in the Henrylyn and 50,000 acres in the Latham, Western and other smaller systems.

### REPORT ON COSTS FEB. 15

Elwood Mead, member of the final Board of Review of Costs of the Federal Irrigation projects, spoke at the third national conference on marketing and farm credits in Chicago, November 30.

Mr. Mead is still at work with the other members of the Review Board, studying the evidence taken before the various project boards. The report of the final board to Secretary of the Interior Lane is expected about February 15, 1916.

Fulton H. Sears, member of the executive com-

mittee of the National Federation of Water Users' Association, spoke to the conference on the organizations of settlers. "Why do all federal officials ignore the Water Users' Association in their discussions of cooperation and marketing?" asked Mr. Sears.

There was no answer from the federal delegates.

### OPEN CHICAGO OFFICE

Layne & Bowler, who are among the leading pump manufacturers, have opened a Chicago office in room 330, Old Colony building.

### SILLO SEALING SUGGESTIONS

There is always some loss on the top of the silage unless feeding is begun as soon as the silo is filled. Where the silage is to stand for some time before feeding, it is customary to run in three or four loads of cornstalks from which the ears have been removed. This material is packed thoroughly; then a liberal supply of water is added, which will help to seal the silo, and only a very small amount of waste will result. Some farmers use oat straw as a covering; others soak the top of the silage with water and sow oats which, when they germinate, form a dense mass which shuts out the air and keeps the silage from spoiling.

## IDAHO PROTECTS IRRIGATED LAND BUYERS

### Idaho

In the future there will be no opening of irrigation projects in the state of Idaho until the irrigation company having charge of constructing the canal and reservoir system has water actually ready for delivery. This is the important policy that has been adopted by the state land board of Idaho.

It is the first time in the history of the state that such a stand has been taken. When approving the contract for the Wickahoney Land & Irrigation Company, which will reclaim 30,000 acres of land in the Bruneau country, the board incorporated a provision covering the water supply.

It is because promoting companies were permitted to sell water rights for lands in the respective projects they had contracted with the state to reclaim that such an unsavory reputation has been given to this state. In many instances these companies permitted the settlers to actually occupy the land before the canals were built. On other projects twice as much land was sold as there was water to irrigate it with. Idaho has profited by experience and there will be no more wildcatting on irrigation works, for the land board also decided to supervise construction of the canals and will see that the systems are constructed as per the terms of the contracts.

The Wickahoney project includes some rich lands. By the terms of the contract 50 per cent of the project

must be completed in the first year and the entire project completed in five years. The estimated cost of construction is \$750,000. Five per cent of this must be placed with the state as security that the company will carry out the terms of the contract. The Thayer-Moore Company, of Kansas City, is furnishing the money to build it.

The Idaho land board has also been advised that the Twin Falls west-end project, which has been dormant for many years, is to be revived. This project is adjacent to the south-side Twin Falls, said to be the most successful Carey act project in the United States. When the west-end project was planned years ago it was found the water supply was short. Since then the south-side project has been extensively settled and cultivated. There is said to be a surplus of water which will be used to reclaim the west-end project.

The Idaho land board has rejected the contract offered the state by the Utah Construction Company for the completing of the Big Lost River irrigation project, because the contract failed to provide for the delivery of a specific quantity of water to the lands within the project. The Utah Construction Company planned to spend a million and a half dollars on the Big Lost River project. For the past eight or ten years the project has remained dormant, owing to the

fact that the big Mackay dam, constructed at a cost of several hundred thousand dollars, failed to hold water. Some two years ago the hope of reclaiming the lands within the project was revived through the purchase of it by the Utah Construction Company. It was sold at public auction.

### Montana

Water users under the canal of the Bitter Root Valley Irrigation Company have employed an engineer to investigate the company's plant and water supply. This engineer is at work and will soon make his report to the local association.

Construction of a \$130,000 irrigation project on Tobacco plains, near Eureka, in Lincoln county, Montana, will begin as soon as the necessary machinery has been installed. M. H. Gerry, Jr., of Kalispel, having let the contract. The district which will be irrigated by this project is one of the most productive in northern Montana. It embraces 10,000 acres and is a great producer of wheat and other grains, as well as alfalfa and forage crops. Water to irrigate the valley will be taken from the Tobacco river and will be stored in Glenn lake, a natural body of water, which will be raised in elevation by a dam. Nelson Rich, of Prosser, Wash., bought the bonds.

Contract has been awarded for the construction of Mission Lateral H



and sub-laterals, Flathead federal irrigation project, Montana, to Wilson Bros., of Polson, Mont. The contract price is \$16,423.50. The contract involves the construction of about 10 miles of laterals and appurtenant structures embracing 43,000 cubic yards of excavation, 140 cubic yards of concrete, 430 square yards of paving, the placing of 9,800 pounds of steel and about 32,000 feet (B. M.) of lumber.

The Carey land board of Montana has granted the Billings Land & Irrigation Company until December 16, 1916, to bring the remaining acres, which it has under contract on the Billings bench, under the ditch. The extension was granted on the report of George R. Davies, assistant secretary of the board. It was shown in the report that the settlers, organized as the Billings Bench Water Users' Association, have arranged for the \$40,000 necessary to enlarge the canals and bring under ditch some 27,000 acres of land. At present, the report says, there are about 16,000 acres under ditch, including some needed land outside of the project proper.

The engineering work done on the project of the Big Horn Canyon Irrigation and Power Company, southwest of Hardin, Mont., has received the approval of the chief of construction of the federal reclamation service, S. B. Williamson, of Denver. The company expects to start work on the project as soon as it can be financed. By a dam 400 feet high, the company proposes to supply water to 100,000 acres of land, part of which are now within the limits of the Crow Indian reservation.

#### Washington

Announcement was made by the Cascade irrigation district, around Ellensburg, Wash., which assumed the bonded obligation of the old Cascade Canal Company about two years ago, that \$75,000 in bonds, which were issued by the old company in 1904, were retired Dec. 1.

#### New Mexico

A settlement with the creditors of the defunct French Land & Irrigation Company, which concern started the Antelope Valley irrigation project, around Springer, N. M., enters into the plans for the completion of the system by the sale of \$325,000 worth of bonds. Kelly & Kelly, of Kansas City, are the prospective purchasers of these bonds. The irrigation system is at present in the hands of a receiver. The irrigable lands now form an irrigation district and the bonds have been voted by the land owners within this district. In order to complete the system, which at present consists of two reservoirs with a combined capacity of 11,000 acre feet, canals, flumes, siphons and waterways, the owners of land within the district have agreed to place a lien upon their lands to be covered by \$400,000 in bonds.

#### California

The embargo on California irrigation bonds, which has lessened their value as bank securities, will be lifted soon, according to a promise made to P. H. Griffin, of the Oakdale Irrigation district, by State Treasurer Friend Richardson. Hitherto, irrigation bonds have not been accepted as security for state deposits, and when the districts attempted to sell the bonds to the banks, they were confronted with their unavailability for use for loans from the state treasury.

Californians were led to believe that the stockholders of the United Railroads of San Francisco would finance the Solano Irrigated Farms project by a motion made in the superior court in the case of Edward Lewis against the corporation to change the title of the defendants from the Solano Irrigated Farms to the original owners and incorporators.

Patrick Calhoun, Thornwell Mullally, William M. Abbott, Paul S. Foster, A. J. Rich, John Farrish, George Cameron, Peter Cook, W. B. Coffey, J. H. Peterson and W. E. Telfer. The Solano Irrigated Farms has no longer a legal existence as a corporation, having forfeited its rights as such by failing to pay the license tax required by law to the state of California.

The Kuhn Irrigation Project, in the Sacramento valley of California, through Receiver William F. Fowler, has petitioned the United States District Court for an order restraining the State Railroad Commission from putting into effect the new rate schedule the railroad commission compiled last June, and which was to have gone into effect Nov. 19. The principal features of the schedule are a rate of \$2 per acre for irrigating ordinary crops and \$7 per acre for irrigating rice crops. The receiver says the rates are far too low, that they are confiscatory, and that the com-



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pany cannot possibly operate at a profit if these rates go into effect. Subsidiary companies, including the Sacramento West Side Canal Company and the Sacramento Valley Irrigation Company, are parties to the action.

#### Texas

The Texas Land and Development Company has renewed work in the irrigation district around Plainview and will begin at once the improving of seven irrigation farms, which have recently been contracted for by farmers from the north and central west. Irrigation plants, homes, barns and orchards will be put on these places and lots arranged for carrying a large number of hogs.

Motion to dismiss the receiver of the San Antonio Land and Irrigation Company, Limited, was filed in the Fifty-seventh District Court at San Antonio, Texas, recently by Harry W. Preston, of London, England, and Sawyer Atkin. The proposed rehabilitation of the company is given as the reason for the motion. On Aug. 31, 1914, S. J. Brooks was appointed receiver of the land company on the petition of Mr. Preston and others, bondholders and stockholders. In the motion to discharge the receiver it is alleged practically all the parties interested as stockholders and bondholders are desirous of settling all differences between them and avoiding further litigation; that the property may go back to the company and be operated by it under the control of its board of directors.

#### Colorado

Contract has been awarded to Mendenhall, Bird & Co., of Springville, Utah, for the construction of schedules 1 and 2, Ironstone Canal, Uncompahgre Valley federal irrigation project, Colorado. The work involves the excavation of 108,100 cubic yards of material and 25,000 cubic yards of overhaul. Contract price, \$30,006.50. Schedules 3, 4 and 5 of this work were awarded to C. B. Sherwood, of Rockyford, Colorado. These schedules call for the excavation of 101,100 cubic yards of material and 22,000 cubic yards of overhaul. Contract price, \$16,681.50. The work is located in the vicinity of Olathe, Colorado.

The Secretary of the Interior has authorized the Reclamation Service to execute the following contracts for earthwork on the main canal and laterals, Grand Valley Irrigation Project, Colorado: Schedules 1 to 8, Reynolds Ely Construction Co., of Springville, Utah; estimated cost, \$28,584.50; Schedule 9, Henry Wilson, Carl Hicks and N. H. Wilson, Fruita, Colorado, \$3,323.50; schedule 10, C. S. Kirkendall and John E. Nelson, Fruita, Colorado, \$2,801.80; schedule 11, Sam Kloczko, Loma, Colorado, \$1,649; schedule 12, J. M. Groesbeck, Springville, Utah, \$2,937.50; schedule 13, James O'Bryan, Fruita, Colorado, \$2,364.50; schedule 14, J. W. Collier, Grand Junction, Colorado, \$1,323;

schedule 15, Wade Collier, Grand Junction, Colorado, \$1,420; schedule 16, Chas. E. Litz, Loma, Colorado, \$1,578.

#### Wyoming

Contract has been awarded to Threet Bros. & Jolley, of Lovall, Wyoming, for schedules 1 and 3, first unit Frannie Division, Shoshone fed-

eral irrigation project, Wyoming. The work involves the excavation of 357,000 cubic yards of material and 117,000 cubic yards of overhaul. The contract price is \$78,760. R. M. Lynn, of Lovell, Wyoming, secured contract for schedule 2, involving 186,000 cubic yards of excavation and 25,000 cubic yards of overhaul. Contract price, \$27,076.

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## CAN YOU DRESS A HOG CORRECTLY?

By ANDREW BOSS,  
of Minnesota College of Agriculture

It is an easy matter to dress hogs neatly provided the temperature of the water is just right. The water for scalding should be heated to a temperature of 200-212 degrees Fahrenheit. On a farm where it must be heated in the house, usually it should be boiling when removed from the stove. If turned into a cold barrel it will then be about the right temperature, 185-195 degrees, when the hog is ready to be scalded. Water at 165-175 degrees will scald a hog, but more time will be required and the results are not so satisfactory. It is not expected that a thermometer will always be used, but boiling water carried from the stove to a cold barrel out of doors will usually be at about the right temperature for scalding, when the hog is put in the barrel, unless there is unnecessary delay.

A small shovelful of hard wood ashes, added to the water, aids materially in removing the scurf from the body, although it has a bad effect in loosening the hair. A lump of lime or handful of soft soap will have the same effect.

While being scalded the hog should be kept moving constantly to avoid cooking the skin. As soon as the hair and scurf slip easily from the surface scalding is complete. If it is suspected that the water is too hot, scald the hind end of the hog first; if too cold, the front end, in order to always get a good scald on the head, which is difficult to clean.

The scraping should begin just as soon as the hog is removed from the water and the more readily it is done the easier it will be. The head and feet should be cleaned first, as they cool quickly. A small hand "candlestick" for scraper is a very convenient tool for the purpose. It may be purchased at almost any hardware store for from 25 to 35 cents.

After removing the hair from the body the hog should be hung up and rinsed with hot water and then with cold, scraping down with a sharp knife to remove all hair and scurf from the body.

## HOW TO SILO CORN

By J. G. WATSON,  
Missouri College of Agriculture

Don't wait too long to fill the silo. Begin as soon as the corn is right for fodder. The kernels should be in the dough stage but dented and the lower leaves turning brown. Let the corn mature as much as possible without becoming so dry that water must be added to make the silage pack solidly and ferment properly.

Cut into pieces half to three-fourths of an inch long to make them pack well and to prevent waste in feeding. This takes more power, but is worth it. Pack well with concrete tampers, keeping the silage higher at the wall than in the center.

Fill slowly, if possible letting the silage settle a day or so at a time. This makes it keep better and increases the amount the silo will hold. This amount may be still further increased by using

woven wire to hold more silage at the top. It will gradually settle into the silo but tends to spoil while doing so. If more silage is added after such settling, take out the spoiled layer at the top.

If caught by frost, the corn for silage should be cut before it dries out. After that, add water. The corn may even be shocked to put in at a more convenient time or to refill the silo if enough water is added.

## IRRIGATION MEETINGS

The annual Oregon Irrigation Congress will be held in Portland, December 28-30, at the Imperial Hotel.

The Nebraska State Irrigation Association will meet in annual convention at Bridgeport December 7, 8 and 9.

The semi-annual meeting of the Associated Irrigators of Western Nebraska was held in Scottsbluff during the past month.

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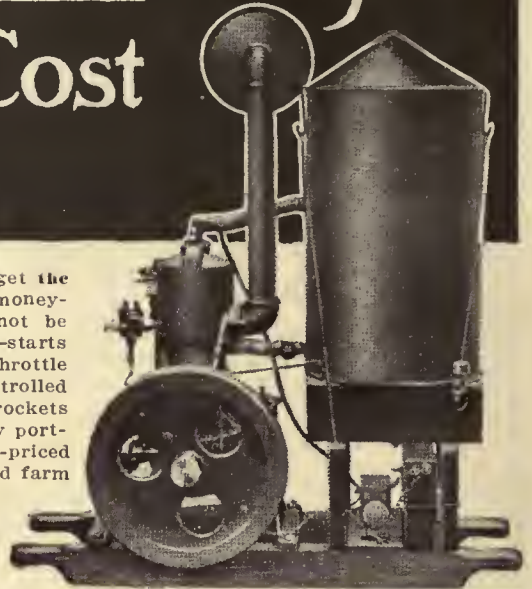
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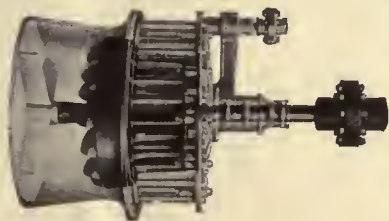
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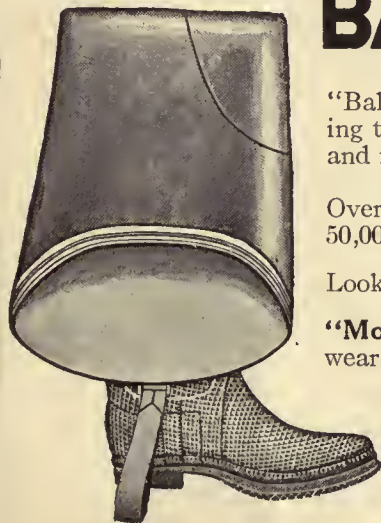
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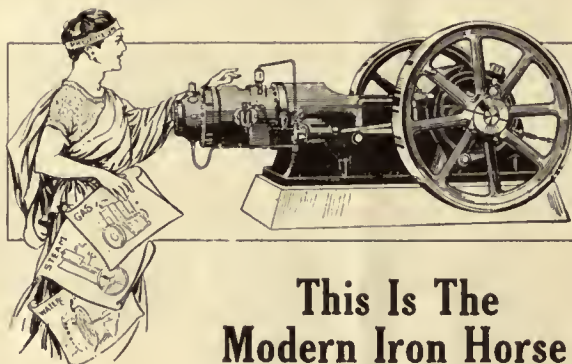
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our sincere wish that he finds you home every time he comes knocking at your door.

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we are still offering the Litchfield Standard Spreader, Five Year Guaranteed, at the same figure placed on it before the  
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Thirty-First Year

# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, JANUARY, 1916.

No. 3

## THE IRRIGATION AGE

With which is Merged

The National Land and Irrigation Journal

MODERN IRRIGATION

THE IRRIGATION ERA

ARID AMERICA

THE WATER USERS' BULLETIN

THE DRAINAGE JOURNAL

MID-WEST

THE FARM HERALD

THE IRRIGATOR

D. H. ANDERSON

PUBLISHER,

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CHICAGO

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D. H. ANDERSON, Editor

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## Interesting to Advertisers

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 31 years old and is the pioneer publication of its class in the world.

Secretary  
Lane  
and His  
Aides

From Secretary Lane's annual report: "The waters that flow idly to the sea could be made to support not less than 50,000,000 people if turned upon the land that otherwise will remain pasture land or altogether worthless. The demonstration has been given that the lands of little rain can be made more fruitful than those where the rainfall is abundant. Land and water we have; the problem of bringing them together is one only of money."

Brief as is this utterance, it embodies the spirit of a great change in the work of reclamation by the government. With such men as Elwood Mead and L. B. Williamson, one of the great factors in the construction of the Panama canal, at the head of the work it will speedily be put upon an "efficiency" basis that should soon lessen the burden of the water-user and vastly increase his benefits.

Mr. Mead is certainly equipped with the expert skill and with the detailed experience of what irrigation has done for Canada and the Antipodes and if he be given a free hand will evolve a solution for many vexing "reclamation" problems.

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Mead's  
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ernment.

It is gratifying to note the eagerness with which the water-users of the country have seized upon the latest recommendations of Dr. Elwood Mead for the improvement of the Reclamation work of the government. It is not an experiment, this of "ready-made farms," which is to be put into effect on two of the government projects. Its success, in the eyes of the farming world, is a foregone conclusion. And so the suggestion is now being made that the western states co-operate in an appeal to Congress to vote a sum large enough to put into effect on all government projects the Australian plan of the "ready-made farm." It is believed that \$5,000,000 will be needed on the twenty-eight government projects.

The state legislatures are already preparing for endorsement and committees will soon be on the way to Washington to start the movement for congressional action.

It appears as though the best results that will be obtained from this action will be to finally stop the great rush of settlers to Western Canada, to the land of the "ready-made farm."

It might prove a deciding factor to give Congress some figures on the loss that this Canadian plan has entailed upon the United States—the loss in money and in the human energy that gets the grain out of the soil.

**About  
Cost  
Review  
Reports**

It will be remembered that in the spring of 1915, under an act of Congress, Secretary Lane appointed cost review boards for every government irrigation project. The purpose was to determine if the construction had been done at too heavy a cost. The findings of the local board in each case will be finally passed on by the Central Board of Cost Review, of which Elwood Mead is chairman and Gen. Wm. L. Marshall, consulting engineer to the Secretary of the Interior, and I. D. O'Donnell, supervisor of irrigation, are other members. E. A. Clark is secretary.

During December Elwood Mead visited the Carlsbad and Rio Grande Valley projects and in turn all other projects are to be looked over. This is for the purpose of getting information in addition to that supplied by the report of each local cost review committee.

There is no doubt but that all these local reports are drastic in their declarations and recommendations. For instance, it will be remembered that the Carlsbad report, after recommending liberal discount on the original construction cost, ended with the sensational statement: "God pity the water-users on the Carlsbad project."

Mr. Mead is not expressing himself as to what the decision of his board will be on any of the projects, but with his vast knowledge of the field, gained first in the agricultural department, later in the reclamation work of this country and of Australia, there is no question but that the central board's final report will recommend discounts on many of the original construction charges.

Reasonable land prices will make a success of every reclamation project. Uncle Sam can better stand a loss than the water-user. If the latter is burdened by useless charges, created largely by reclamation mistakes, take the load off and let Uncle Sam pocket the loss. But help the farmer to success. That's our bread and butter.

**What  
Is  
This,  
Bureaucracy?**

From all parts of the west, wherever the water-users on government projects are struggling to crawl from under the heavy load of federal charges, there come protests against the recent ruling requiring remittances to

be made to Denver or Washington and stipulating that these remittances must be in currency, post-office money orders or bank drafts.

It is really a petty matter, and such rulings are generally the result of a trifling inconvenience in the headquarters to which all payments and reports eventually go. The fact that it adds to the expense of the water-user to make his payments away from his home headquarters weighs but little against the added comfort of a few clerks. That thousands are inconvenienced by such rulings is of no import if the bureau can lighten the labors of a clerk or two.

But its pettiness becomes even more apparent when the hardships of the new settler are considered. To him red tape is a bugaboo that he flies from, for trained as he has been to the horny-handed occupation of crop raising, bookkeeping and the intricacies of filing entries and the circumlocution of getting at a claim by the most roundabout method possible are just so many drawbacks to actual occupation of the land.

To be told that he cannot make payment at the office of entry, to tell him that he cannot get his certificate until the far-off official says it is all right, is to add to the delay and to put the poor man to additional expense and to much inconvenience.

In the matter of relinquishment, too, it means much delay, and delay always means trouble and expense.

Why not simplify these rules? Consider the thousands of settlers in the matter, Mr. Secretary, and not a few clerks who may be somewhat inconvenienced by the old sane and simple methods.

**Endorsing  
the  
Jones  
Bill**

By the end of this month practically all of the state and district Irrigation Associations will have held their meetings. As predicted in the last issue the sentiment in favor of the Jones bill, which proposes that the United States government should guarantee the securities of irrigation districts after they have been carefully studied and endorsed by proper departmental officials, was practically unanimous. The convention at San Francisco acted promptly on the matter and without a difference of opinion. The Nebraska State Irrigation Association, held in December, followed with like action. The convention at Portland was thoroughly in accord. The same action was taken by several of the California conventions. At North Yakima on January 10 there will be the same unanimity.

Congress is hearing from the west in no uncertain tones on this project.



## STATES SHOULD HELP RECLAMATION WORK

Verner Reed Supplements the Advice of Elwood Mead

The prosperity of the Rocky Mountain states has for some years been less than the actual conditions warrant, and now that it is steadily increasing we should do all that we can, as individuals and communities, to both accelerate it and insure its permanency. Among the things that in recent years promised most and contributed least to our prosperity were the government reclamation projects. There is no doubt as to the inherent soundness of the idea underlying the reclamation work—that the federal government, in the interest of the permanent prosperity of the entire country, should construct and put into operation irrigation projects that by reason of great cost or other difficulties were beyond the reach of private capital to construct.

It goes without saying that every hundred thousand acres reclaimed from the desert and added to the productive area of the country is better than would be the annexation of that much land from a foreign country. But delays, often due to lack of capital, and other reasons, have militated against this service, with the result that the policy cannot justly be said to have proven either a success or a failure. The most of the projects might be compared to houses that are constructed with the exception of the roofs, windows and doors, and cannot be made profitable until they are finished. Also, much expensive theory, a sufficient amount of inefficiency, and other of the numerous things that always stand in the way of the realization of success of most big projects are chargeable to the reclamation projects.

What has been needed has been the same business efficiency, the same regard for profit and loss, and the same prompt action that all enterprises, big or little, must have if they are to succeed. And all who have seriously made studies of this matter will admit that under the administration of the Honorable Franklin K. Lane, Secretary of the Interior, the government reclamation projects are now handled as economically and efficiently as though they were private or corporation enterprises. And, this being true, it is well for us who are so deeply interested to forget the disappointments, inefficiencies and delays from which the projects suffered before Mr. Lane instituted his vigorous and effective policy, and join with the government to put all these projects upon sound, successful and profitable bases without further delay.

Under Secretary Lane the reclamation projects are now headed by two men, each in his line as great a proven expert as there is in the world, being Dr. Elwood Mead, who stands at the head of efficiency irrigation experts, and S. B. Williamson, who in connection with Colonel Goethals, built the Panama canal. The Grand Valley irrigation project in Colorado, one of the projects entirely completed under Mr. Lane's administration, stands as an example of prompt, economical and efficient construc-

tion. It is first class in every detail and constructed to stand the years. It covers more than seventy thousand acres of fine land, suitable for alfalfa, wheat, truck and fruit culture, all near existing railroads, and this land is lying idle waiting the hand of labor. But to reclaim deserts and make sagebrush lands profitable is a long road, and to shorten this road Dr. Elwood Mead advises the application of the plan which the Australian government, under his direction, and the Canadian Pacific Railroad, now have in actual profitable operation.

Dr. Mead advises the making of "ready-made farms," i. e., that the government shall clear and level the lands, fence them into farm units, and upon each unit build a house, stable, cistern and silo, and sell the completed unit to experienced farmers at actual cost for the water and improvements, allowing the farmer to pay for the farm in thirty-six equal annual payments, the payments covering both principal and interest, and with proper discounts for advanced payments. If to Dr. Mead's plan could be added the wise regulation imposed by ex-Land Commissioner of Colorado Volney Hoggatt, that each settler should own or buy enough live stock to insure his success, I think the plan would insure the success of any serious farmer settling upon the projects.

No part of Dr. Mead's plan is experimental. Every phase and detail has been tried out and has succeeded in Australia, New Zealand and Canada. Under his plan projects that seemed doomed to absolute failure now are wholly successful.

Out of the twenty-eight existing government projects Dr. Mead and Mr. Williamson have chosen two to be used to demonstrate the wisdom and success of this plan. One of the projects chosen is the Grand Valley project in Colorado. But to make the demonstration on the two chosen projects money is required—about \$5,000,000 for the two projects. And here is where Colorado can help. To secure this appropriation from the present congress will require organized effort, all the influences that can be marshaled and lots of hard work. An organization, something on the style of the Fruit Growers' auxiliary committee (which succeeded by co-operative work) should be formed and financed; if necessary, one or more able representatives of this committee should go to Washington and remain there until the appropriation is granted, and if the work must assume such proportions the work must be financed by subscriptions from interested parties and public-spirited men.

In short, what is now needed to secure this great work for Colorado is a man or committee who will be the motor for the work—and such a man as the work will seek instead of the kind of men who usually seek such work. The success of securing the appropriation and the immediate colonization of the Grand Valley project, would also permanently benefit the entire state.—Denver Post.



## PRACTICAL SUPERVISION BY RECLAMATION AGENTS

A Strong Appeal for Continuous Expert Advice on Reclamation Project Lands. Written for the Irrigation Age by Newton Hibbs, Salmon, Idaho

A practical supervision of the reclamation projects by the government should be maintained until the business of farming on the small tracts is established on a profitable basis. The farm adviser is necessary on every project in the irrigated regions, especially. This adviser should be a credited agent of the government, and then the establishment of a rural loan system would be very simple.

The reclaimed lands are universally fertile. The production of good crops can be assured for every season is assured by advice and instruction. The question of profitable markets is one to be mastered under the prevailing conditions which bring special features to every project.

There is no section of the country in which a crop that will return at least \$50 an acre cannot be grown by irrigation under practical direction. Meat and dairy products have a universal market value, regardless of geographical location. This branch of farming is cited only as one example. In it is a solution of one of the high-cost-of-living problems for the whole country as well as one feature of success for the reclamation settlers.

It would not be practical to outline in this letter more than one of a dozen systems of farming that are available for the settlers of almost every project of the great Northwest. The writer has acted as an instructor for the new settlers on private irrigation projects with the result that general success became a fact apparent to every observer.

The secret of success on those private propositions was largely due to the fact that loans were secured for the purchase of stock for every farmer who had grown feed to carry the stock to an increase of value in the fattening pen or the breeding yard. This class of security of loans to the full value of the stock is recognized as the very best by all bankers who have had experience in that line.

If the government would establish a system of superintending and advising for the new settlers ample rural loans would at once become available, which would enable all the farmers to secure stock to consume their hay, grain and roots. On the private enterprises the advice of the agents who have filled this position has never failed to secure rural loans sufficient to make the settlers prosperous. Such a source of information from a government agent would make an effective rural loan system very simple and safe.

On a private project where the writer had undertaken to guide every purchaser of a tract to a degree of success there were an old man and a worthless son. They were on a ten-acre tract which had been cleared of the sage brush and plowed late the previous year. On this sod the former owner had planted a half-acre of peas of an improved early garden variety. These had been allowed to ripen,

and they were stacked under an improvised shed.

The shiftless son had abandoned the old father and the little farm before the spring work season opened. The father was a discouraged subject when it became the duty of yours truly to guide him to success as a small-tract farmer. An old horse, this stack of peas and a limited credit at the store were the sum of this old man's assets when the planting season opened.

The advice to the old man was to thresh these peas out during the dry days of the early spring and to sow the whole ten acres broadcast with the seed obtained. This he did early in April. The field was harrowed corrugated for irrigation, which taxed the old man and his poor horse to the limit of strength. The land was new and free from weeds. The peas grew to a very big crop and they were ripe early in July. They were valuable only for feed, as the market was overstocked for green peas. The local bank, on advice, furnished the money to buy 100 pigs, which were turned into this field of peas in July. The average cost of the pigs was \$3 each. On the first of October these pigs were sold at a net profit of over \$1,000.

This old man's success was due entirely to the rural loan which he was enabled to secure by the presentation of the conditions of his security to the banker by the field agent who directed the farming operations. This instance is given only as an example to emphasize the importance of the superintendence of the farm operations on the reclamation projects, and the provision of rural loans for the settlers as well as other farmers. Safe rural loans can be provided by making advisers agents of the government to determine the safety of the investment of the borrowed capital. These farm advisers are seriously needed in every farming community. It would be well if the government had such an agent in every county of the United States. A safe rural loan system would be assured if practical facts were available from official sources to pass upon the security offered to protect rural loans. Capital would flow to such safe channels whenever the security was made certain by official certificate.

### WASHINGTON

Over 50 cases will soon be begun in the Federal court, Washington, against parties holding water rights under the Sunnyside canal, Yakima county, for delinquency in the payment of maintenance charges. Authority has just been given F. A. Garrecht, Federal attorney for the district, to begin these actions for the Reclamation Service. The water rights on which these actions are to be brought are rights originating under contracts with the Washington Irrigation Company, taken over by the Reclamation Service.



## GAGE HYDRANT USED BY THE GAGE CANAL COMPANY OF RIVERSIDE, CALIFORNIA

THIS hydrant has been developed, and, so far as is known, is only used by the Gage Canal Company, of Riverside, Cal. The main box is of mortar 2 inches thick and is made in the material yard and seasoned before setting. The concrete is made of 1 part cement and 3 parts coarse sand, mixed quite dry and thoroughly tamped. The bottom is cast separately and the top cemented to it in the field. The dimensions of the box are shown in the drawing.

The weir crest consists of  $\frac{1}{8}$ -inch x  $1\frac{1}{2}$ -inch iron cemented to the sides, giving a final opening of 10 inches wide and  $10\frac{1}{2}$  inches high. One man makes two boxes in a day.

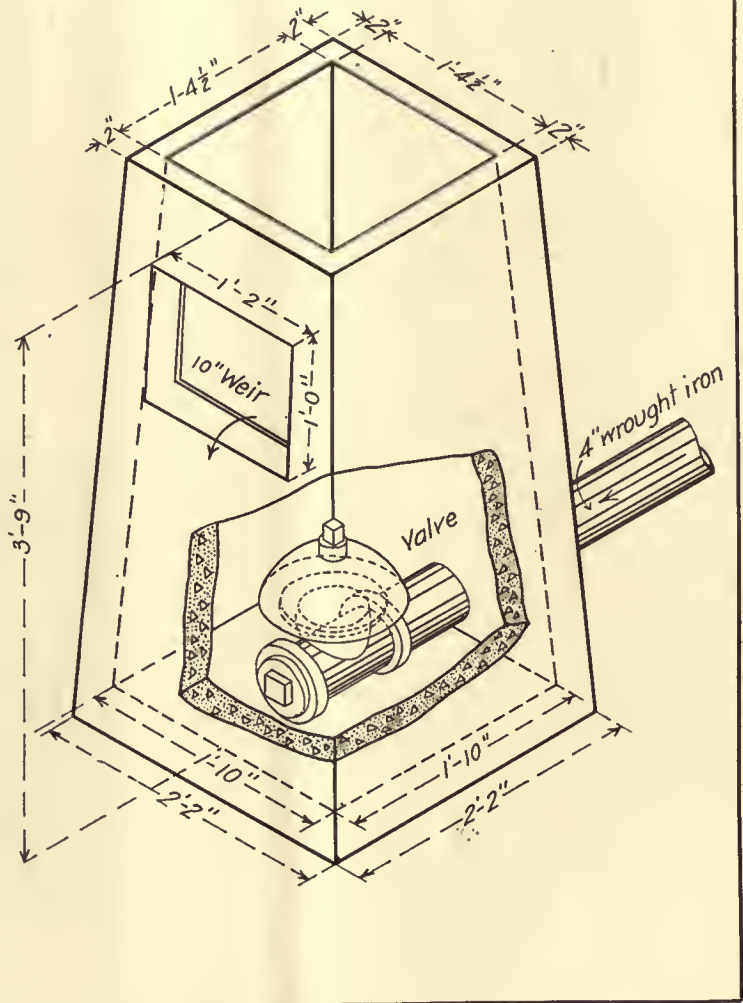
In making one box  $2\frac{2}{7}$  sacks of cement are used.

The outlet chamber into which the water goes after passing over the weir is omitted from the drawing. In the hydrant installed at Davis a half section of 18-inch pipe is used for this purpose. When the hydrant is not in use the valve shown in the drawing at the end of the pipe is kept closed. When in use the valve is opened to the desired extent and the water rises from the valve and flows over the weir.

The amount flowing is determined by measuring the depth of the water in the box above the crest of the weir and either figuring the discharge or taking it from a table.

The depth of water on the crest is usually obtained by measurement from a bracket set level with the crest at the back side of the box. After the water passes the weir it can be caught in various ways and carried to its point of use.

In the tests with this hydrant it was found that



the water discharged for any given depth was greater with the box than it would be with a standard 10-inch weir.

## GARDEN CITY EXPERT GIVES PUMPING RESULTS

Mr. G. S. Knapp, who has for the past two years been in charge of the Kansas State Irrigation plant on the Furney County farm in the Garden City district, has given out some interesting tentative results for 1915.

The irrigation plant at the station, prior to 1913, had done nothing and was not in a condition to operate. As soon as Mr. Knapp had so far remedied the difficulty as to put the plant to work, he made tests. These were entirely satisfactory.

For 1914 these tests showed a decrease in cost per foot-lift of 52 per cent.

While the exact figures to show the results in 1915 are not yet available, there are some facts already known. The results when completed will show some reduction in cost, due to the use of an oil filter which in a September test saved and returned 75 per cent of the oil used, and the cost of fuel oil this year is about  $1\frac{1}{4}$ c cheaper than it was a year ago, as shown in above table. Since irriga-

tion began in May and up to the date of this article the irrigation plant has been ready to go to work supplying all water needed for irrigation, at any hour, and there has been no delay nor any expense for repairs of any kind.

For the season of 1915, practically no repairs have been made on the plant. As this season's data are not at present worked out in entirely available form, the cost of pumping is taken to be \$5.00 per acre-foot, although in reality the cost has been much reduced.

The cost of spread water is figured at 70c per acre per acre-foot of water.

The field carrying capacity of the soil at the Experiment Station, this being a silt loam, has been determined by experiments to be approximately 30

inches of water for the upper 10 feet of soil. The minimum point to which this water can be reduced by the growing crop is about 22 inches for the upper 10 feet of soil. The amount of water used by the various forage crops is from 10 to 15 inches. Hence with an average yearly precipitation since 1897 of 20 inches, it is judged that 12 inches of water applied in irrigation is sufficient to supplement the rainfall in normal years in producing the general field crops. As alfalfa produces four crops during a season it naturally requires more water.

The roots of field crops penetrate to a depth of 8 feet as determined in field moisture sampling and in isolating root systems. They may penetrate deeper than this and probably draw moisture from the upper 10 feet of soil.

## CONCRETE STANDARDIZING BOX AT THE DAVIS FIELD LABORATORY, BERKELEY, CALIFORNIA

CONCRETE standardizing box 30 feet long, 9 feet wide, and 6 feet deep (all inside measurements) with partition 12.75 feet from the upper end containing an opening 5 feet wide, 1 foot above the bottom of the box, a similar opening 5 feet wide having been left in the lower end of the box. These openings are so equipped that weirs or orifices of desired sizes can be set in them, making it possible to use either a standard weir or a standard orifice in testing the various devices. Water from the reservoir is brought into the box with a downward flow into a slightly suppressed pool and must pass from the pool over a bulkhead 12 inches high and through a baffle before reaching the weir or orifice set in the opening in the partition already referred to. Four pieces of 4-inch channel iron 9 feet long are set directly below the baffle board and when desired furnish a spill with an aggregate length of 72 feet for aiding in keeping a constant head over the standard weir or orifice.

When planning the installation this was considered a necessary part of the control on account of the water supply from the reservoir being fed to the standardizing box under a diminishing head. The channel-iron spills all discharge through a 6-inch iron pipe into a well on the side of the main box out of which water spilled can be measured through a circular orifice of any necessary size.

### Western Canada Irrigation Congress Calls for More Surveys

The irrigation undertakings of the Canadian Pacific Railway were under discussion at the ninth annual convention of the Western Canada Irrigation Association, which was held at Bassano, Alberta, the center of the eastern section of the C. P. R. Irrigation Block, on November 23, 24 and 25. The convention aroused widespread interest and about 180 delegates, principally from irrigated districts of Alberta and British Columbia, were present.

A resolution was passed asking the Dominion government to diligently proceed with irrigation



In the tests thus far made this spilling device has not been used because it has not been found necessary to maintain an exactly constant flow during the tests. The elevation of the bottom of this box is 90.6 feet above datum.

surveys east and west of Lethbridge in order that these farming communities might "avail themselves of the benefits of irrigation without delay." The Dominion and provincial departments of agriculture of Alberta and Saskatchewan were petitioned to initiate a widespread system of popular co-operative experiments with alfalfa on the basis of supplying to such farms as have available well prepared and otherwise suitable areas under irrigation. The convention also requested that a well directed and energetic educational propaganda be initiated by the departments of agriculture to convince settlers on irrigated lands generally that the only road to com-

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## MISTAKES OF FARMERS IN IRRIGATION WORK

Professor T. H. Cherry, one of Australia's leading irrigation experts, has recently published in the *Agricultural Gazette of New South Wales* an interesting article on the effect of careless irrigating.

It is applicable in many ways to our own over-irrigated sections. He writes as follows:

If the reasons for such failures as have been made by fruit-growing irrigationists in Australia to make their properties payable propositions were sought out and tabulated, the "misuse of water" would be found if not the principal one, at all events high up on the list. There are in most of our irrigation areas fruit-blocks, some of them abandoned, that are known as "wet blocks"; these blocks have become water-logged through injudicious irrigating or insufficient drainage, or both. In one of them, seepage starting in a spot where surplus water has been allowed to accumulate, its progress marked by dead and dying vines and fruit trees, slowly spreads right over the block, and perhaps to others adjoining, if stringent measures are not taken to check it. In many of these blocks deep shafts have been sunk, sometimes with success and sometimes without, in the hope of finding a sand-drift, perhaps 100 feet beneath the surface, by which the surplus moisture may be drained away.

This trouble is nearly always avoidable, even on land where the natural drainage is poor, by the even distribution of water in sufficient, but not more than sufficient, quantities, and by proper attention to cultivation. Mistakes, no doubt, were made in the laying out of many "wet blocks"—mistakes against which the reader already has been warned—which have made the land difficult or impossible to irrigate properly; but there are many "wet blocks" the spoiling of which has been due to careless watering pure and simple.

It must not be thought that irrigation is all done on the surface, or that it is finished when the water has been cut off from the head-ditch, and has ceased to flow in the furrows; the water may be moving underground for days afterwards, and this movement should be studied by noting the difference in the amount absorbed in different parts of the farm and the time it takes to irrigate them, by sinking holes before and after irrigation.

There are patches of land which will take, apparently, almost any quantity of water, where water will simply pass through the soil and lodge somewhere else; there are others, notably in Mallee country, where though the soil may be perfectly dry, water will run for hours in a furrow without penetrating more than a couple of inches; and others again which will hold the water for a period, after which it will suddenly disappear, where if a 3-foot hole is sunk a fortnight after an irrigation a foot of water will rise in the bottom of it, while in a similar one dug a week later the ground may be found almost dry. The irrigationist must, therefore, study each block individually, and learn to irrigate it in such a way that every part will get the water it requires, and no more. A "wet" block may be cured

as a rule by means of draining tiles, or in places where there is no possibility of surface drainage by sinking a shaft to a sand drift in the manner indicated above; but a good many "wet" blocks might be cured simply by the careful and judicious use of water and by thorough cultivation. If it is evident that a patch of ground is getting water below the surface which was intended for other parts of the block, it should be given less on the surface, i. e., given only one irrigation while other parts get two or three, and in some cases, left unirrigated altogether. If such a patch shows near the head-ditch or midway down the rows it will be necessary to get water past it to irrigate the land at the far end of the rows. This may be done by making a small temporary earth ditch of one of the furrows higher up the block, from the head ditch to a point past the wet patch (or better still, by laying removable lengths of 6-inch down-piping on the same block), and taking the water from that point across the furrows as required.

Where there is a patch of ground which, owing either to the steepness of its grade or to that "greasy" quality to be found in places where mallee and certain other trees have grown, will not absorb a sufficient quantity of water if irrigated in the ordinary way, the number of furrows may be increased; and if there is a limestone patch which will take an excessive amount of water, the number of furrows may be diminished.

The more furrows there are the more the surface of the ground is exposed to the water, and the more quickly it will absorb it; and conversely the fewer furrows there are in a piece of land, the longer it will take to water it. Applying this simple fact will considerably aid in the even distribution of water.

In the settlements on the Murray, where the water-supply is obtained by pumping, an irrigation once started proceeds from necessity day and night until it is finished. The disadvantages of irrigating at night are obvious, but where land has been well laid out for irrigation by the furrow system, and irrigators understand their business, the advantages outweigh them. Continuous irrigation is the more economical as regards both the quantity of water used, and labor in distributing it, but what concerns the settler still more is that, if he has a continuous stream of water on a block, he is much better able to judge when the land has had sufficient water and is saved a lot of trouble in the regulation of it. Difficult or badly laid out portions should be finished in daylight, but there should be no difficulty in the irrigation of blocks well laid out on the furrow system at night time if the head ditches are in good order, the stream regular, and the boxes properly set.

The frequency with which lucerne should be irrigated depends altogether on the amount of sun heat available to it. In cool cloudy weather when it grows but slowly, lucerne does not use much

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### PUMPING IRRIGATION IN KANSAS

(By F. B. Nichols in the Mail & Breeze of Topeka)

Pumping irrigation in western Kansas is developing rapidly. The business has definitely passed the pioneering stage, and this rapid growth has come as a result of the big profits. Especially good returns have been obtained on the shallow lifts, where the depth of water is 50 feet or less. Along with this, however, has come very encouraging success on the uplands, and it seems that water may be lifted profitably from greater depths than was formerly thought possible. Very encouraging success on high lifts has been obtained by the Garden City Sugar and Land Company, which has twelve plants where the lift is from 150 to 165 feet, and on the Garden City Experiment station, where the draw down is 130 feet.

Most of the pumping plants have been installed as drouth insurance, to supply the water needed for plant growth during the dry periods when the yield would otherwise be reduced greatly. As a general rule the larger part of the moisture is supplied by the rainfall, but a small amount applied by irrigation at the right time frequently has a very beneficial effect in increasing crop yields and profits. According to E. E. Frizell of Larned, the president of the Kansas State Irrigation Congress for 1916, there were but two seasons in the forty-two years he has lived in Pawnee county in which irrigation was not needed, and 1915 was one of these.

The average rainfall in Kansas, when taken over a series of years, is not increasing, and there is nothing to indicate that it will increase. Farmers are learning to use the water supply more efficiently, however, and this has resulted in a great increase in the yields. That is why the future of farming in western Kansas is decidedly bright—there is going to be a greater growth in the agriculture in the western third of the state than is generally appreciated now. Much of this, however, is coming because of irrigation—from the use of the limitless supplies of water which the wise Creator has placed under this wonderfully fertile soil. Did you ever consider some of the excellent yields which have been produced under irrigation in Kansas? Do you know that J. W. Lough of Scott City and E. E. Frizell of Larned have grown more than seven tons of alfalfa to the acre as a season's yield, that the Garden City Sugar and Land Company frequently has produced more than fifty bushels of wheat to the acre, that yields of more than twenty tons of sugar beets are obtained, and that A. L. Stockwell of Larned has grown more than twenty tons of kafir silage an acre? Do you know that last year on the Garden City Experiment station, where the rainfall was but ten inches, the kafir which had received twelve inches of water by irrigation gave a yield of forty bushels of grain and 6,600 pounds of stover? The production cost was \$13.20, which included an excessive cost for the water from the 130-foot lift, and the profit was \$16. These yields are above the average, it is true, but they would not have to be nearly this large to show that the irrigation paid well. It is true that there are irrigation plants in western Kansas which have not paid, but it also is true that many of these were not installed

and managed efficiently. Good farming is required along with the water, of course—the fact that the average yield of sugar beets on the fields of the Garden City Sugar and Land Company is fourteen tons, while the average for the district is but eleven tons, indicates this.

Every farmer in Kansas ought to watch the development of irrigation carefully—this is true in the eastern part just as well as farther west, for you will see considerable pumping along the streams there in the next few years, especially for the more valuable crops. The dry years will come again, and the water is going to be needed greatly. Farmers who expect to install plants should visit some of the leading irrigation centers, such as Garden City, Scott City and Larned, and talk to the men who are actually doing things in irrigation. Expert help can be obtained from J. W. Lough of Scott City, state irrigation commissioner; H. B. Walker of Manhattan, the head of the irrigation work of the Kansas State Agricultural College and secretary of the Kansas State Irrigation Congress; and George S. Knapp of Garden City, an engineer in the government service.

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water and an irrigation at intervals of from three to five weeks will be sufficient; but in the long hot days of midsummer it grows rapidly and uses up water very quickly, and in some soils an irrigation every ten or twelve days will then be necessary to get the maximum results. Some growers advocate even more frequent irrigation, giving lucerne two light waterings to one cut; some irrigate just before cutting in order that fresh growth may not be delayed while hay is being made and carted; others prefer the delay to the inconvenience of making hay on wet ground.

Lucerne hardly grows at all above ground in the winter, and consequently requires little water at that time. Where lucerne is irrigated by flooding by means of check banks, it is advisable, in most cases, to avoid night watering if possible; a farmer who grows both fruit and lucerne (separately) may turn the water into his orchard or vineyard at night and irrigate his lucerne beds by day. Where the modification of the furrow system described in Part III is used, there should be no difficulty in irrigating at night.

Vegetables may be irrigated by the furrow system, applied, of course, on a smaller scale than in the case of fruit trees or vines, but they require more frequent water in smaller quantities. Some kinds, like pumpkins, melons, etc., are very easy to water, and may almost be said to look after themselves. Root vegetables like carrots and turnips are more trouble, but the hardest vegetable to grow in this way is the potato, which needs very careful watching because if the earth round the tubers lacks sufficient moisture even for a day or two they will inevitably start a fresh growth when they get the water, and a crop of diminutive and ill-formed tubers will be the result. Too much water will spoil potatoes by making them soapy and musty-flavored.



## WATER RESOURCES OF VICTORIA

At the present time, some 250,000 acres are irrigated in Victoria, Australia, and a policy of steady development is being carried out, with a view of ultimately bringing an extra 500,000 acres under irrigation. The Sugarloaf Reservoir is in course of construction, and, when completed, will impound 320,000 acre-feet of water. The storage at Waranga Basin is being increased to impound 330,000 acre-feet. Other storages are contemplated under the Murray Waters Agreement, and it is anticipated that when the present and prospective requirements are met some 750,000 acres of land will be placed under irrigated culture.

## A VIGOROUS PROTEST

It is apparent that the government will be compelled to modify its recent orders to water users on Federal projects. The objection to the recent ruling is well put by the editor of the Churchill County Eagle, at Fallon, Nevada. He says:

"After January 1, 1916, all payments due the U. S. Reclamation Service for construction and operation and maintenance charges must be remitted direct to the Denver office, in accordance with General Order 98. Bills will be rendered direct to the water user from the Denver office and the remittance must be made in currency, postoffice money order or bank draft.

"This will necessarily be a source of inconvenience and a little more expense to the water users. It would be much easier for the water users to be able to deal direct with the local headquarters, as in the past, and it appears to this paper that the interest and convenience of the water users is the first thing to be considered in administering reclamation affairs.

"If subject to cancellation, the law forbids the delivery of water until the full payment has been made. Then in case the water user cannot raise the money until about the time his crops are hard pressed for water, he must still wait until the money goes to Denver and the notice of its payment sent back to Fallon before the local officials would be permitted to turn on the water. But this is not all. If there are any penalties and these are overlooked, or the farmer does not figure out the per cent penalty to a cent, just as the government does, the entire remittance must be sent back to the farmer to make good the trifling deficiency before he could be given credit—meantime his crops might be burning up for want of water that is running to waste.

"But it does not stop here. After the 1st of January, when a new settler comes in and makes application for homestead entry, he will be informed at Reclamation headquarters that they cannot accept his money for the first water payment of \$3 per acre, but that it must be sent to Denver; neither can they issue to him a certificate to accompany his homestead application to the Carson Land Office, until they have received notice from Denver that he has made the payment there. Under present regulations, his homestead application must be accompanied by the certificate that the water payment has been made before it can be accepted at Carson City. Therefore, it would appear that the prospective settler must wait until his money can be sent to Denver and the order comes back to the local headquarters before the certificate can be issued. Then he may send his application to Carson City, and in the course of a few days will receive notice of the acceptance or rejection of his entry.

"There will also be a degree of uncertainty in the matter of relinquishments, and this probably will be a source of great inconvenience to the homesteader who desires to sell, for the prospective buyer is likely to get out of the notion before all of the desired information can be secured from the Denver office.

"The question very naturally arises, why cannot these matters be attended to here in Fallon? If it is a question of economy there are most assuredly other changes that could be made with which the water user has nothing to do personally. In fact, aside from the distribution of water, the only direct dealings the farmers have with the service is along the very lines that has been sent away beyond the Rocky Mountains to Denver. In the future when a water user steps into the local reclamation office to straighten out some tangle, he must be informed that it will be necessary for him to correspond with the Denver office, while the same affair could no doubt be settled with one-tenth of the trouble by a short conversation with the local officials. Correspondence at best requires a great deal of time and many times is anything but satisfactory in business dealings."

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plete success lies through the alfalfa field, into the feeding and breeding of live stock.

A very interesting soil products exhibition was held in connection with the convention. Seager Wheeler, Rosthern, Sask., carried away a large share of the prizes in grains and grasses. He was awarded the first prize for hard winter wheat, first for hard spring wheat, first for threshed spring wheat, seconds for oats and for red clover, and third for alfalfa. Another Saskatchewan man, from the irrigation section of Maple Creek, namely, W. H. Abbott, also made a killing with firsts for barley, brome grass, western rye grass, timothy, fodder corn and alfalfa.

The judging committee was composed of W. H. Fairfield, superintendent of experimental farm, Lethbridge; G. H. Hutton, superintendent of experimental farm, Lacombe; Dean E. A. Howes, of the faculty of agriculture, University of Edmonton; and Deputy Minister of Agriculture W. E. Scott, of Victoria, B. C.

Some fine exhibits were made by the Publicity Branch of the C. P. R., Calgary; the Southern Alberta Road Company, Medicine Hat, Alta.; G. D. Walters, of the Irrigation Branch, Department of Interior, Calgary; Dominion Experimental Farm, Lethbridge; and A. L. Fryberger, a farmer at Gem in the Bassano Irrigation Colony.

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## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### Nebraska

The Nebraska State Irrigation Association at its annual meeting in Omaha in December endorsed the tri-county irrigation project, which contemplates a big ditch to lead the flood waters of the Platte upon the soil of Gosper, Phelps and Kearney counties. It was pointed out that this project could in no way infringe upon the rights of any other irrigation project, since it contemplates using only the flood waters that otherwise go to waste and simply help to swell the destructive floods of the lower Mississippi. They favored a federal appropriation for this purpose. The convention recommended to congress that the Jones bill, now pending, be passed. This is the bill introduced during the 1914 session of congress, providing for a guarantee by the federal government of the payment on bonds to be issued by irrigation and drainage districts in the United States. The convention resolved that the attorney general of the state should be requested to bring action in the courts to enforce the rights of Nebraska citizens on the South Platte river against the water users in Colorado.

Pump irrigation is to be demonstrated in Lincoln county on a large scale. Prof. L. W. Chase of Lincoln has decided that the pump irrigation is to be tried at the experimental sub-station south of North Platte.

### Idaho

After two days discussion with representatives of all the electric power companies operating on Snake river in southern Idaho, the public utilities commission in December finally approved the schedule of rates for electric power for irrigation pumping purposes from April 1, 1915, to October 1, 1917. For installation of less than 10 horsepower. Demand charge, \$12 per year per horsepower of maximum demand, plus an energy charge as follows: Five cents per K. W. H. for first 45 K. W. H. per horsepower of maximum demand per month; ½ cent per K. W. H. for all current consumed over 45 K. W. H. per horsepower of maximum demand per month. Discount of 5 per cent on monthly bill if paid within 10 days from date of bill. Maximum bill: The company, under this rate, will not bill the consumer for irrigation pumping service more than \$28 net per horsepower of maximum demand for five months' service, nor more than \$33.50 net per horsepower of maximum demand for six months' service. Other rates show slight reduction for larger uses.

### Oregon

On the sandy soils of the Umatilla Reclamation Project in Oregon it is necessary to handle irrigation water

very carefully in order to get the greatest benefit. Many tests were made on the Project Experiment Farm located at Hermiston, Ore., last year, to determine the most economical methods of handling irrigation water. The specialists in charge of this work lay emphasis on the use of short irrigation furrows, ranging from 100 to 200 feet in length, and 20 to 30 inches apart, using fairly shallow, well-opened furrows to facilitate the flow of water. They also advocate that water should be run for only a short time in one place, as loss soon occurs from deep percolation. Since the storage capacity of this soil is very low, only a small amount of water should be used for each irrigation, and frequent applications made to maintain an adequate supply for plant growth. Best results were obtained by using a comparatively large stream of water while irrigating, in order to cover the land as quickly as possible.

The Oregon Irrigation Convention, held December 28 at Portland, endorsed the Senator Jones' bill now pending in Congress, providing for Federal guarantee of irrigation district bonds. The time of the convention was largely devoted to a discussion of the district method of financing and developing irrigation projects.

### South Dakota

A big irrigation project contemplating the reclamation of from 100,000 to 150,000 acres of land in what is termed the Angustura district, has been started there, and is receiving promises not only of federal, but of state aid as well.

### Arizona

The underflow of the Gila river will be made to furnish water for irrigating 14,600 acres of land in Yuma county if an application just filed by the state land department is granted and the plans of a California syndicate are carried out.

Arizona holds a big irrigation conference at Tucson, January 14. Officials of the various water users' associations from all over the state, practical irrigators, and professors from the State Agricultural College will be on hand to discuss practically all the problems peculiar to irrigating in Arizona.

### Utah

The Utah irrigation law, authorizing any person desiring water for irrigation purposes to enlarge existing canals after compensating the owners, has been declared constitutional by the United States supreme court.

The Utah Construction Company of Ogden, purchaser of the Big Lost River irrigation project and its irrigation system, is taking steps to pro-

tect its rights against the threatened cancellation of the lands within that project by the government. The commissioner of the general land office notified the state land department that unless something was done on the Big Lost River project the lands would be turned back to the public domain. January 1, 1916, was the date named for the required showing to be made. In the meantime settlers have squatted along the Big Lost River taking land for homes and have appropriated such water as was needed for irrigation purposes from the river. This appears to have complicated matters in relation to the project although the register of the state land board has ruled that the squatters are without rights to the water or any of the land in the project under the present status.

### Texas

Washington and Austin are to co-operate in irrigation investigations in Texas. This decision was reached at a conference in Austin between R. P. Teele, assistant chief, Bureau of Public Roads and Rural Engineering, Irrigation Investigations, Department of Agriculture, of Washington, and W. L. Rockwell, in charge of the San Antonio office, for the Government, and J. C. Nagle, chairman of the Board of Water Engineers and E. B. Gore and John Wilson, members, for the state.

Besides the station at Mercedes, on which the first appropriation is to be expended, stations contemplated are at Plainview, in the South Plains; at El Paso, and at some point in the San Saba-Colorado basin region of Central Texas.

### Wyoming

Wyoming comes in for nearly two million dollars in the estimates sent to congress this week, for its government irrigation projects, \$850,000 being the amount asked for the Fort Laramie unit, \$767,000 for the Shoshone project, and \$250,000 for the interstate canal. A total of \$64,200 is asked for road work, distributed as follows: Roads in the Yellowstone Park to Belt Line, \$38,700; roads east, \$7,500; widening roads east, \$6,000; roads south, \$10,000. Three public building estimates were also transmitted to congress—\$30,000 for Buffalo, \$15,000 for Cody, and \$5,000 for Basin.

### New Mexico

Elwood Mead and E. A. Clark, president and secretary, respectively, of the board of cost review for irrigation projects, visited the Carlsbad project in December to determine for themselves the worth of the improvements made by the reclamation service. Their actions are anticipated with special interest as a result of the report of the local cost review board,



composed of Scott Etter, for the water users; W. D. Murphy, for the government, and Prof. Taylor of the University of Texas, as the third and disinterested member, which closed with the phrase, "God pity the water users on the Carlsbad project." This report recommended substantial discounts from the original cost figures.

Under authority from the secretary of the interior the reclamation service has awarded the following contracts in connection with the Rio Grande irrigation project, New Mexico-Texas. To Toohey & Johnson of Phoenix, Ariz., for the excavation of approximately 162,000 cubic yards of earth for the Leasburg canal and the Picacho branch canal in the vicinity of Hill, N. M.; contract price, \$23,000. To H. E. Williams of El Paso, Tex., on the San Elizario feed canal near Ysleta, Tex., amounting to about \$3,149.50. To John Mulligan, El Paso, Tex., earthwork on the San Elizario feed canal, amounting to about \$2,838.

The Rio Mimbres Irrigation Company has forfeited its \$25,000 bond because it has failed to build any of the projected dams or reservoirs on lands purchased from the state, and also has lost its rights under contracts entered into with the state. The company sets up that subsequent investigations proved that there was not sufficient flow of water to justify the irrigation works, as planned, and will

appeal to the state supreme court. During the hearing, in December, it came out that the company had already expended \$325,000 to develop a water supply and that it now has twenty-three wells, sufficient to reclaim from 5,000 to 7,000 acres for which it will get deed from the state under the decree.

#### California

The canal from Richvale and Nelson Road to Butte Creek in Butte county, northern California, has been completed and will be ready for delivery of water at the opening of the irrigation season. The canal is 50 feet wide on the bottom and 70 feet at water line.

The California State Water Problems Conference, created by the last legislature has held several meetings at the office of the state railroad commission in San Francisco to discuss with irrigation engineers and others best way of proceeding to accomplish the work for which they were appointed.

The Water Users Association of Glenn county has decided to take up the selling of project land in accordance with the plan recommended by C. H. Blanchard of the United States Reclamation Service, and which is already being handled so satisfactorily to all concerned by the Elephant Butte Water Users' Association in New Mexico. The plan calls for the appointment of an agent to handle the lands of the project listed for sale in much the same manner as they are now handled by established realty firms. Any stockholder in the association can list his project lands with this association, the selling of which is to cost the usual commission, five per cent of the sale price. The big point of the system right is that every dollar paid as commission, above the operative cost of the system, will be used to advertise the Orland project throughout the United States.

The Butte Valley Land Company of Macedoel, Siskiyou county, California, has contracted with Chapman &

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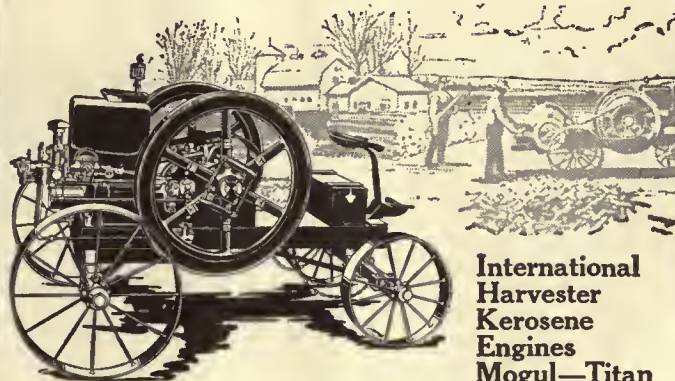
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Company, contractors of Klamath Falls, Oregon, to construct a large ditch ten miles long, with laterals running the entire length of its large holdings in Butte Creek Valley.

One of the largest irrigation systems in Lassen county is now under way by the Eagle and Honey Lake Exploration Company, which plans to store sufficient water to irrigate 160,000 acres of land. The project is in charge of Colonel Carl J. Young. It is proposed to construct three dams for the conservation of the run-off of the watershed, and this will be distributed to users by means of three ditch lines.

The surveys made by the engineers of the Oakdale and South San Joaquin irrigation districts for reservoirs have been completed and will be presented for consideration of the boards at their meeting in January. These surveys are to be used in working out the reservoir system to supply water for the months of October and September, when the natural flow of the river is low.

The third annual convention of the Inland Waterways Association of California will be held at the Palace hotel, San Francisco, February 21-23.

#### Colorado

The big dam, sixty feet high, at Paradox is completed and settled so that leakage is impossible. The new reservoir will store water for eight thousand, five hundred acres of land, counting one acre foot to irrigate an acre of land. Another and yet larger reservoir is yet to be constructed, which will probably take water to East Paradox.

The affairs of the Standley Lake project near Denver are still in a turmoil and are no nearer solution than they ever were. The project went into the hands of a receiver in 1910 and the expense has amounted to \$1,500,000. Under a reorganization formulated in 1912 and made operative August 12, 1913, the Chicago Title & Trust Company undertook a plan to refund and then finally to discharge all the debts. In the more than two years that have elapsed since that time the plan has been carried out only to the extent of inducing creditors to waive their claims in return for various forms of questionable notes and certificates. Now the company is asking the court for an order to make a loan of \$226,088.64, a prior lien over all other debts previously incurred by itself, the various receivers of the irrigation company. The Antero project which was getting along all right until the City of Denver recently purchased its reservoir in the South Park, together with the old English Highline canal for \$1,250,000, but the money has not yet been turned over and there is some hitch in the deal.

According to the Gunnison News-Champion an irrigation proposition has developed near the head waters of the Gunnison river which will have

more or less effect on the flow of the Gunnison tunnel. It seems that farmers in Saguache county have constructed an irrigation project with the idea of diverting the waters of Cochetopa creek to the other side of the divide. As these waters heretofore found their way into the Gunnison river the Gunnison paper claims that the flow of the Gunnison will be lessened to that extent, which it is said will be five feet.

The Reclamation Service is asking for proposals for the construction of about nine and one-half miles of the Peach Valley Lateral, Uncompahgre Valley Irrigation Project, Colorado. The work lies in the vicinity of Austin, and involves the excavation of about 56,200 cubic yards of material in open cut. The bids will be opened on January 18, 1916, at the office of the Reclamation Service, Montrose, Colorado.

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## OO SIZE AUSTIN TILE DITCHER

The difficulties to combat in drainage work seem small to the uninitiated, but are very real to the experienced. Mother earth is peculiarly liable to break a contractor who takes drainage contracts who is unacquainted with the latest and most up-to-date tools wherewith to tackle the job. Many fortunes have been dissipated in the bringing out and exploiting of so-called tile ditchers that at first blush seemed flawless, and there are a large number of graveyards scattered through the country of just such machines, and even in this up-to-date century of ours there are few machines that can rightly claim attention. It is commonly known among contractors that one type of machine may be all

President Chas. W. Fairbanks' ranch. This is swamp land, and below the loam is the famous blue gumbo with the consistency of chewing gum. When this machine was put on the job everybody expected it to be a failure. The reverse happened. It made good from the start, and has been operating in that vicinity for the past five years, and is still working today. A machine of this size can be operated at a cost of about \$14.00 per day, conditioned upon the price of fuel and labor. Usually a good operator can be gotten for about \$125.00 per month, and with distillate selling at reasonable prices, the oil bill, which includes lubrication as well as fuel, together with the wages of one helper,



OO Austin Tile Ditcher at Work

right for dry hard ground, another for soft—one will work fairly satisfactory where the excavated earth will scour the digging buckets, but directly it comes into soft, sticky material its uselessness as a machine for that type of digging becomes apparent.

Thus, with a machine of the type shown in the picture available to all drainage contractors there is going to be a big reversal of costs of digging ditches that come within the range of these machines.

The illustration shows a OO size Austin Tile Ditcher at work in Southern Illinois on Ex-Vice-

should not exceed \$14.00 for the entire day's run.

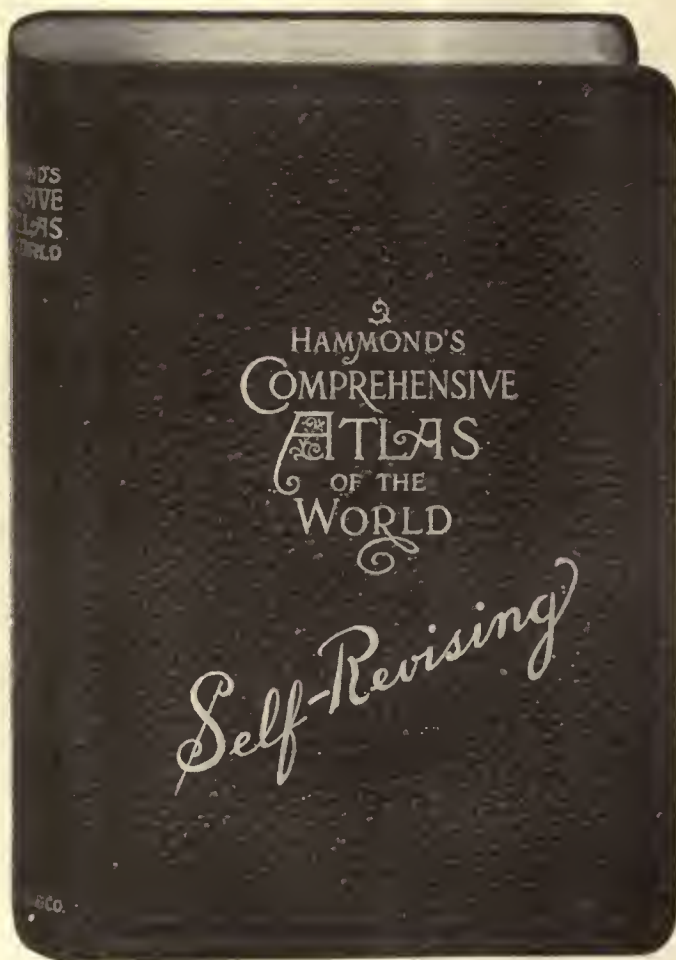
There are many large tile projects being developed in the United States, and this is the first of several articles dealing with this particular subject.

The illustration shows that the grade line is in evidence, and a needle attached to the machine follows this grade line, so that the least digression is easily discernible and instantly checked by the operator. The caterpillars on the machine enable it to travel over very soft ground, and there is apparently no limit to the size of caterpillars where the character of the work is for large areas.

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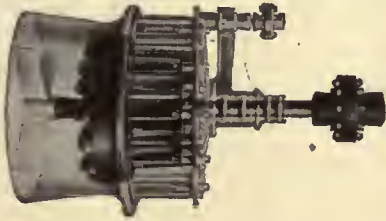
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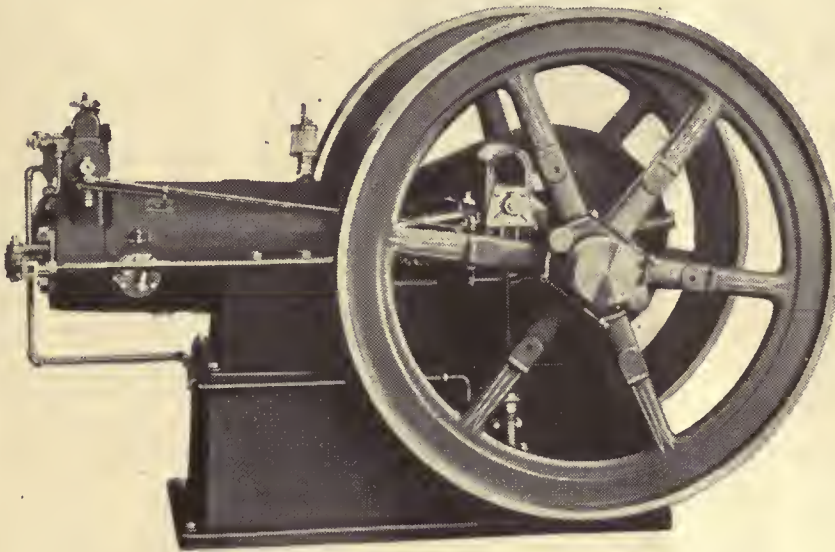
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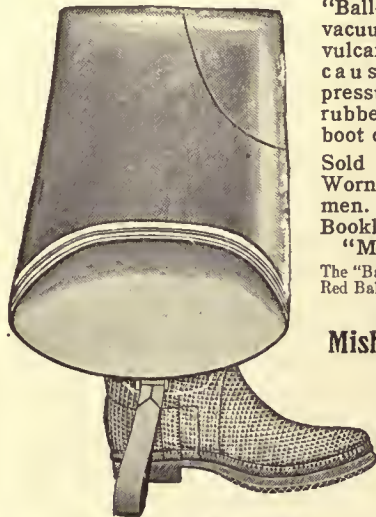
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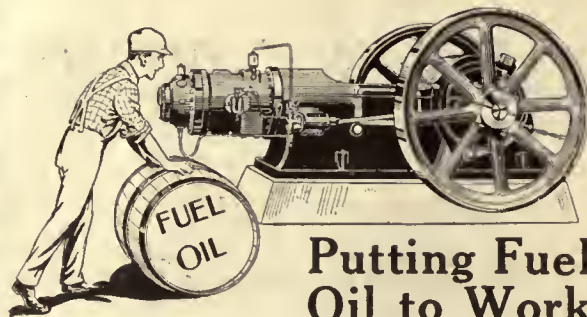
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# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, FEBRUARY, 1916.

No. 4

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### Government Sells Heat and Light to Settlers

Gradually the government irrigation projects are developing their varied possibilities. In practically all of them are movements to harness the power aside from their use for irrigation. And in one, at least, the success along these lines is exceedingly gratifying. In Rupert and Burley, Idaho, three out of every four homes get their heat and light from the government project at Minidoka. What the extent of this electric power is can be best imagined when it is noted that the water is lifted 70 feet by the use of 10,000 horsepower. In the winter especially this is available for heating and the current is sold for \$1 to \$1.25 per month per kilowatt.

### El Paso Preparing for Big Festival Next Fall

El Paso is arranging for a festival of Valleys and Plains, to be held in the fall, to celebrate the formal dedication of the Elephant Butte dam. The men in charge represent all the valleys under the government's great ten million dollar project.

The most notable feature will be a joint convention of the International Farming Congress and

the International Irrigation Congress. Both organizations have opened headquarters with the Chamber of Commerce of El Paso and the work of preparation for the big event is now in full swing.

### Irrigation Bonds Coming Into Favor Again

There is a distinctly favorable attitude toward irrigation bonds developing in the investment centers of the country. This is due to several causes. First of all, there is a determination in all the western states to place the state and its credit back of every thoroughly approved irrigation project. For this purpose the bankers of the west have joined hands with irrigation experts to clean out the country of every semblance of wild-catting and to discountenance every effort at watering stock.

In Oregon, at the meeting of the Irrigation Congress in January, the most influential bankers and land men of the state expressed themselves strongly in favor of a state guarantee and favored an organization for the purpose of passing a constitutional amendment which will permit of the development of every acre of irrigable land in its boundaries through guaranteed bond issues.

In Washington more stress was laid upon the

effort to pass the Jones bill for government guarantee, but state aid in the form of a million dollar appropriation, which was to be loaned out, was strongly urged by Governor Lister.

In Colorado there is at present on the statute books a law which permits the state to buy approved irrigation district bonds with school funds, and this is being invoked to give impetus to the development of the state.

The big men of that state are also taking up the plan suggested by Verner Z. Reed of direct state aid for irrigation projects.

The result of this clean-cut campaign for land development is shown in the pulse of the financial centers.

A year ago the irrigation men who came with bonds to sell received but scant courtesy. Today they are welcomed and their projects are being investigated for purposes of investment.

The entire issue of the Oakdale district of California, which amounts to \$400,000, was recently placed without the slightest trouble. Within the next two months several millions now under investigation will find their way into the market.

#### **Pan-America to Co-operate in National Reclamation**

At the Pan-American Scientific Congress, which has just closed its sessions in Washington, it was found that in matters of land reclamation every American nation has the same problem on its hands for solution.

While there was a discussion of many topics of international interest, much time was given to the subject of irrigation. Under the wise leadership of Elwood Mead, of Professor John A. Widtsoe, of Utah, of Prof. P. E. Fuller, of the Department of Agriculture, of Prof. J. T. Harding, of the University of California, of C. W. Sutton, of the State Water Commission of California, of C. J. Blanchard, H. G. Shedd and others as prominent from Central and South American countries, the first steps were taken to secure uniformity in irrigation laws and practices.

The suggestion that each of the American nations appoint a commission to investigate and study in their respective countries the practices of regulating the uses of water, its distribution, methods of conservation and the adjudicating of water rights came from Dr. Augustin Mercau, dean of the engineering faculty of Argentina. This was adopted both by the sub-section that discussed it and by the congress.

This, therefore, may be termed the first great step looking to international co-operation in matters pertaining to land reclamation. It means that within the next few years we will have the benefit of all the great work that is being done along irri-

gation lines in South American countries by some of the most noted of the world's engineers. And they in turn will benefit by our progress.

The resolutions adopted are of a like progressive tenor. They advocate national and state aid, so that every possible acre of land now lying waste in the Americas will be made productive.

#### **The Vexing Problem of Rural Credits Discussed**

The Australian state of Victoria has started more than four thousand farmers in business, lending them money and letting them pay for the land and improvements at 4½ to 5 per cent. So far, the state of Victoria has made \$500,000 on the plan.

What can be done in Australia can be done in our western states. And the movement is well on its way to fruition. There is one thing quite certain. Not until some such plan is put into effect in the west will there be a change in the gradual decrease of rural population and the increase in city peopling.

Thousands of men are needed for the work. The men with the necessary industry, skill and ambition can be found, but they lack the capital. The men who have the capital either lack these qualities or are unwilling to become farmers. If the states will place their credit behind the farmer, men with money will lend it. The task before each western state is to prepare the land for the farmer, to select the right men for backing and to start them with initial capital on terms of repayment which are within their means.

#### **Mow the Weeds Along Irrigation Ditches**

Weed seeds are spread in many ways. Wind is probably the most important agent. In irrigated sections, however, water also is undoubtedly a very important agent in carrying weed seeds from field to field, and even from farm to farm. Irrigation ditch banks are usually permitted to grow up in weeds. If these weeds are allowed to ripen their seeds, the latter will fall into the flowing water and are spread out on fields further down. On the way the seeds are soaked up and are just in the proper condition to germinate when they reach the irrigated soil. These facts point out the urgent necessity of mowing the weeds along irrigation ditches before they ripen their seeds.

Send \$1.50 for The Irrigation Age, one year, and the Primer of Irrigation, paper bound, a 260-page finely illustrated work for beginners in irrigation.



## IRRIGATION BONDS WILL HAVE STATE AND NATION BACK OF THEM

There is apparent all over the east and middle west where capital has been sought for irrigation projects in the past, a decided improvement in the market for irrigation bonds. We quote in this article from various sources to show how universal is the determination to place states and nation back of the bonds, to put a ban on wild-catters, on bogus project promoters and to squeeze the water out of irrigation stock.

The Boise, Idaho, Statesman, in its issue of January 2 has this to say on the subject:

"No more projects will be opened in this state before the irrigation system is completed and the water is ready for the settler to turn onto his land. That is the policy that was adopted by the land board in 1915. If it had been adopted eight years ago Idaho would not have suffered some of the humiliation it was forced to through the incompetency of engineers and unscrupulous methods of promoters who besmirched the good name of the state to advance their schemes. When at its height three years ago this state proudly boasted of \$100,000,000 invested in irrigation projects. No other state in the union had done so much under the terms of the Carey Act. The past year has seen little development in irrigation matters aside from the crowning engineering feat of the Reclamation Service in the erection of the great Arrowrock dam, the highest in the world.

"Indeed, the year has been confined to renovating some of the projects that have not been a success, and a special commission created by the last legislature and appointed by Governor Alexander has been on the job investigating projects. Some of the reports this committee made were not pleasing to those back of the projects. The supporters of the commission claim, however, that it did its duty. It recommended that the acreage in the Twin Falls-Salmon River project be cut down because of the water shortage. It urged that caution be exercised in relation to the Twin Falls-North Side project, that the company be required to enlarge its canals, that it be cut down by abandoning the Clover Creek segregation. It recommended that the acreage in the Twin Falls-Oakley project be reduced to 24,300 owing to the shortage of water. With relation to the West End-Twin Falls project it urged that suit be instituted against the promoters to recover on the company's bond. The state took over the King Hill project and the Big Lost River project was sold to the Utah Construction Company of Ogden."

J. A. Keating, one of the most prominent financiers of the Northwest, in discussing "The Fundamentals of a Bond Issue" before the Oregon Irrigation Congress said, among other things:

"The machinery which has been created to finance the paving of streets in cities, can also be used to finance irrigation projects; first, because the people of the state are accustomed to this device and will, I believe, approve its use for other pur-

poses, and, second, because such securities can be sold readily.

"Investors and underwriting houses are accustomed to buying municipal bonds, and they will be receptive to bonds similar to the City and State bonds, issued for irrigation purposes."

Mr. Keating declared that he believed that the voters of Oregon will freely support a measure providing for the development of a financial plan for irrigation development such as he outlined.

A. L. Mills, president of the First National Bank of Portland, put himself squarely and emphatically on record in an address before the Oregon Irrigation Congress banquet in favor of the state issuing irrigation and drainage bonds to the extent of at least two per cent of its assessed valuation of \$900,000,000, which would be \$18,000,000.

The state should not merely guarantee the bonds of irrigation districts, but should be the primal debtor itself, the speaker said.

He declared that the bonds would be bought "like wildfire." The state could recoup itself from the owners of the land in payments extending over a long term of years and would lose nothing, but would get the money at four per cent or possibly less. Oregon's credit, Mr. Mills said, is first class, as it has no public debt now.

Mr. Mills said that if the state undertook to issue such bonds they should be taken out of politics. He suggested the appointment of a commission, three by the granges, three by the commercial organizations, and three by the bankers of the state, these nine to get together and name three others to be appointed by the governor.

This commission, he said, should have competent engineers, and every project should be thoroughly investigated before being undertaken. He asserted that Portland citizens would be glad to care for their share of the burden, even though they pay a third of the taxes, as "the head has grown faster than the body."

"The renovation of irrigation projects has resulted in a check being put to the downward course of irrigation bonds, and it is believed, now that the period of evolution is over and the projects have been placed on a proper basis, money will seek investment in the bonds."

The Portland Oregonian, in a recent issue, discusses the change in irrigation economics in the following optimistic strain:

"Men in charge of the finances of irrigation projects can calculate more closely what total investment will be needed, how fast land will be occupied, how rapidly returns will come in and at what pace they will grow. The government has taken out of the field the largest and most costly projects and has left those which are handled more easily in all respects. Many farmers have become familiar with the science of irrigation and are more ready to undertake its application. The ground has been cleared by much costly work, which was



in the nature of experiment, and the knowledge thus gained can be applied.

"With a view of lending national credit to the financing of future projects for application of this knowledge Senator Jones, of Washington, introduced his bill. It provides in substance that the Secretary of the Interior, on behalf of the Government, may guarantee bonds issued by an irrigation district for a Reclamation Project which he approves after examination by Government engineers. The bonds are to run for not more than forty years nor to bear more than 4 per cent interest. In case of default by the district the Government may foreclose. The district being a co-operative body of land owners, there is no room for speculation, as in the case of a company operating for profit, and there is every inducement to economy. The Government is protected against liability for projects which are not feasible, for on finding that to be the case it can refuse to guarantee bonds on them. The district has no inducement to promote an unworthy project, for debt and foreclosure would result.

"If Congress cannot be induced to pass the Jones bill, each Western state can safely and wisely guarantee district irrigation bonds, if proper limitations on total expenditures are established. They are more vitally interested than is the Government, for lack of irrigation cramps their development in far greater proportion than that of the nation as a whole. If it be desired to increase the security, the states can add their guaranty to that of the nation. Whether state or nation, or both, stand behind the bonds, construction and operation should be in the hands of the district, of course, under the eye of the guarantor, who would desire assurance that the work was done according to the design approved. We should then have a combination of local initiative, local construction, and local primary liability, with state or national credit and general supervision. That combination should effect economy and expedition in doing the work."

The Oregon Irrigation Congress also acted in the matter. A constitutional amendment was favored by a resolution submitted to the Congress by the resolution committee, which would provide a state guarantee for principal and interest of irrigation and drainage bonds, as well as for a state system of rural credits.

A committee was named for the purpose of calling a conference of what is to be known as the State Irrigation Drainage and Rural Credits Conference, and this latter body is to make all arrangements to conduct a campaign in behalf of the proposed amendment.

The Portland Oregonian, commenting on this action of the Congress:

"If Congress should not act, we shall then be ready for business; if Congress should act in a manner to supply the need, the state can step aside and no harm will have been done. If Congress should adopt an unsatisfactory plan, we can go ahead under state law. There are undoubted advantages in national action—uniform bonds and methods in all the states, a broader market, lower interest—but Congress may attach unworkable conditions.

"The working out of the plan can be provided with safeguards which will reduce the state's risk

to a minimum. No guaranty would be given to the bonds of any district until all the plans for improvement of a district or purchase of land had been approved by a state board, its engineers and appraisers. A system of amortizing debt extending over a long term would steadily reduce the principal while the security was growing in value and while the debtor's equity was increasing.

"The bond-guaranty would be paternalistic, but all governments have become paternal. It would be in line with the laws by which Germany, Austria, Italy, Britain and even Russia have used government funds or government credit to assist tenants to buy farms. It would not promote socialism; on the contrary, it would be a protection against socialism. There is no stronger bulwark against socialism than a large body of farmers, each owning the small tract of land which he cultivates. Socialism finds its recruits among the rent-paying workmen of the cities. Owning no home, having no fixed residence and no permanent job, they are in constant doubt where they will work and live, and they lend a ready ear to the doctrines of unrest."

In this connection the following from the Stockton, Calif., Record is interesting:

"The irrigation bond market is looking up. E. K. Knight & Co. of Los Angeles, who bought the recent \$400,000 bond issue of the Oakdale irrigation district, are now ahead of their contract, calling for delivery of more bonds than had been specified. They have already sold \$187,000 worth of the bonds, which are now bringing 96 and a fraction. The South San Joaquin district has an issue of approximately \$575,000 yet on hand, which are now being sold. These are five per cent bonds, which were left in the treasury to be used for the construction of reservoirs. The district has received numerous inquiries for these bonds, and expects to receive a number of good bids, as probably no more irrigation bonds will be issued for some time to come.

## SOUTH AMERICA AFTER IRRIGATION MACHINERY

A report from an American consular officer in South America states that a representative of several private interests is in the United States with the object of purchasing drainage and irrigation machinery for large and small canal dredging, machinery for the transportation of earth, bridge connections, etc. The representative also desires to meet electrical construction engineers and manufacturers of water-power electric machinery. Quotations on water-power and electric-transmission equipment, as well as offers for the construction of a large capacity water-power electric plant are requested. Bank references are given.

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## IDAHO ADVANCES IN IRRIGATION LEGISLATION

At its last session the state legislature of Idaho appointed an Irrigation and Drainage Commission to recommend changes in the state's irrigation laws. The report of that body was completed a few days ago and was turned over to the governor of that state. It is in part as follows:

"With two different methods of filing on public waters of the state, and especially since there is no record of the filings under the constitutional method, numerous conflicts have arisen as to priority rights; irrigation litigation has been multiplied many fold and a feeling of uncertainty exists among the water users on many of our streams. The existence of these different methods of acquiring water rights have complicated the adjudication of the water rights on the various streams of the state, to the detriment of the water users thereof.

"It is the opinion of the commission that the constitutional method should be abolished. To do so it will be necessary for the legislature to pass a resolution for submission to the people for ratification, and the quickest time within which it can be hoped to accomplish this would be in November, 1918. There should exist but one method whereby water rights can be acquired, and that method should be through the state engineer's office, so that complete records of the water filings on the respective streams could be kept for the use of the public. Such records would especially prove valuable for the intending appropriator.



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to fix the duty of water from year to year, and to have general supervision of the waters of those states. All matters pertaining to the irrigation industry come under their jurisdiction. The plans followed in those states have proven highly successful, and are worthy of consideration.

"In the state of Oregon, during the first three years of the state water board, 965 separate water rights were adjudicated at a cost of approximately 10 cents per acre. Adjudications have been speedily and satisfactorily made in Wyoming at an even less per acre cost.

"With possibilities for irrigation development far in excess of her sister states of Wyoming and Oregon, there should be created in this state a board

"The two methods of appropriating our public waters have provoked much unnecessary litigation when it came to adjudicate the waters of those streams upon which two different kinds of water filings have been made.

"The states of Oregon and Wyoming have what is known as a state water board and a board of control, respectively, whose principal duties are to adjudicate the water rights,

of irrigation, whose duties would be to have general supervision of the entire industry of irrigation and drainage, to have full supervision of the waters of the state, their appropriation, distribution, diversion, adjudication, and of all the various officials connected with the administration of the water laws. They should be given

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(Continued on page 62)



Enormous Centrifugal Pump Being Hauled to Snake River, Idaho.

### SOUTHERN PACIFIC TAKES OVER IMPERIAL DISTRICT

The Southern Pacific Railroad Company had signed a contract with Imperial Irrigation District, which assures possession of the \$3,000,000 irrigation system of California Development Company.

The execution of this agreement marks the consummation of negotiations covering practically the entire period since the organization of the irrigation district four years ago. Heavy judgments against the defunct California Development Company by the Southern Pacific and New Liverpool Salt Companies, as a result of the break in the Colorado in 1906, caused the affairs of the big irrigation system to be under litigation continually, and kept the water supply in doubt until the present time. The Southern Pacific has finally reached an agreement with the Salt Company, together with Boaz Duncan and other bondholders of the Development Company, whereby the Southern Pacific will deliver title of properties on both sides of the Mexican boundary line to the irrigation district, according to the contract just signed.

A recent decision of the state Supreme court ordered an appraisal and public sale of the irrigation system to the highest bidder, and the Southern Pacific has agreed to bid the system in and turn it over to the irrigation district in return for bonds at par. With the signing of the contract comes the announcement that all claimants to the irrigation system have agreed to waive appraisal of property and permit the sale to be made.

### FARMER REPLIES TO ELWOOD MEAD

In a recent article contributed to *THE IRRIGATION AGE*, Mr. Elwood Mead, of the Reclamation Service, indicates that if a bill were introduced in Congress which would provide Reclamation farmers with that needed relief, a terrible howl would be heard that such a law would be class legislation; that it would be subsidizing one class of citizens and thus giving them an advantage over other classes.

In reference to the matter, an Olathe, Colo., farmer has written Mr. Mead about conditions in that valley, and in regard to the class legislation proposition, the farmer's letter said:

"The farmers of every agricultural nation must first be prosperous before the nation can become prosperous.

"The very great per cent of the people of every agricultural nation depend for their prosperity on

the very small per cent of the people who produce the raw material—the farmers.

"In all years when conditions are normal, prosperity abounds throughout the nation, when big crops of all kinds are produced throughout the nation.

"The opposite is true in all years when crops are scanty.



Main Irrigating Canal, Imperial County, California.

"To help the farmer is to help everybody else, and help all others as much as the farmer.

"A large production of raw material sets in motion the wheels of all classes of commerce, transportation and manufactories, and the activity spreads to all avenues of labor and trade, the material handled increasing in value with each handling, and every handler getting a 'divy' and getting it, not by robbing some other fellow, but from the nation's increase in wealth.

"And it is to be kept in mind that the farmer's 'divy' is greater than that of any other man who has anything to do with the stuff from the time it leaves the farmer to the time it returns to him in the form of finished products.

"The man who produces the raw material is the only fellow who can properly be subsidized or otherwise assisted.

"He is the only person who can receive assistance under circumstances that will cause every other person in the nation to receive equal assistance."

The farmer explains that when he was writing the foregoing, he did not flatter himself that he was telling Mr. Mead anything which that eminent economist did not know, but was writing to show how the matter looks when seen from the spot where the farmer stands.

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# BOTTOMLESS LAKES AS IRRIGATION RESERVOIR

By Victor H. Schoffelmayer, in "The Southwest Trail"

Among the wonders of New Mexico are the "Bottomless Lakes" near the town of Santa Rosa, seat of Gaudalupe county. These lakes appear to occupy several crater-like openings in the earth and extend for some miles on both sides of the present bed of the Pecos river.

That they are hundreds of feet deep has been substantiated by sounding lines which have been dropped, it is said to a depth of 600 feet without finding bottom. The walls of the rocky depression in which Twin Lakes are situated bear testimony to either volcanic or geyser action. The slopes are precipitous. Not more than ten feet from shore

the white limestone and tufa cliffs beneath the water's crystalline surface may be seen to descend perpendicularly. So clear is the water that the lakes in fine weather have the color of azure. A stone dropped into the waters can be seen to a great depth in its descent. The sides of the cliffs beneath the surface are covered with twisted cedar trees and strange plants. No fish or other forms of animal life were found in the lakes by early settlers, but of recent

years the lakes have been stocked with perch which thrive in the cold, clear waters. Sight of Twin Lakes fills the beholder with a mixture of fear and mystery. The outlines of the ancient craters can be followed plainly in the present shoreline. Both



Scene on the Bravo Ranch Near Nara Vista, N. M.



A Farm Home on Irrigated Land Near Nara Vista, N. M.



Vineyard in Garden at a Home in Nara Vista.  
(Courtesy Rock Island Lines.)

lakes are as circular as if their borders had been traced with a surveyor's line. Some years ago when the stage of water in the lakes was lower the rim of a third crater-like opening could be traced, so that in reality, the "Twin Lakes" were really triplets.

In the present age of irrigation and enterprise to recover a dry land region, attention has been directed strongly to the Santa Rosa lakes as sources of water supply. Surveys showed that the water level of the Twin Lakes was four feet above the general level of the valley to be irrigated. Twin Lakes are on the Baca estate, the grant conveyed to Don Celso Baca, a Spanish noble

who came to Santa Rosa sixty years ago. There are 1,000 acres in the tract. Don Celso died in 1909, after which the heirs settled the estate. There are 550 acres of irrigable land, which have been placed on the market. Besides Twin Lakes there is a spring-fed water course known as Aguio Negra Chiquita and Laguna Escondito and Black Lake, from which water for irrigation purposes can be obtained. The maximum lift would not exceed twelve feet at any

time, no matter what the stage of the water. The irrigation project really consists of two distinct enterprises. Twin Lakes are located east of Pecos river and Agua Negra Chiquita on the west side of the stream.

## "BENEFICIAL USE" TO STOP BIG WATER WASTE

"Use, beneficial use, is the only right to water which an individual may acquire." This statement, which is the kernel of an interesting article in the Boise, Idaho, Statesman, written by Earl W. Bowman, applies to every district in the country. An opinion delivered a few days ago by the attorney-general of Texas carries the same import in connection with projects in that state. The article by Mr. Bowman follows:

The irrigation development of southern Idaho will stop now if the principle involved in the report of the irrigation law revision commission covering the Big Wood river and other projects is carried to its ultimate conclusion.

The commission, in its report upon these projects, has made a deplorable fundamental mistake. Its recommendations touching these Carey act tracts constitute a most grievous injustice not only to the projects themselves but to the irrigation industry as a whole as well.

By advising area reduction in these instances instead of duty increase or some plan of more efficient application, the commission has advanced a principle that conflicts with the constitutional provision that use, beneficial use, is the only right to water which an individual may acquire.

It has done more than that. It has shown that it has failed utterly to grasp the more comprehensive idea of complete irrigation development. It has bound itself with the individualistic theory that an irrigation right is a fixed title to a measured flow regardless of the "necessity of subsequent enlarged development."

The finale of this can only be that vast areas for which, under proper distribution and use, there is ample water must ever remain arid, useless, desert of no value to man or the state.

The Snake river drainage provides an annual run-off which may be used for irrigation sufficient to give every acre of southern Idaho land that is tillable an adequate supply.

The problem is to so distribute and use that this is all available.

The simplest and, in the long run, the cheapest, solution to the whole question of supply would be the construction of the American Falls reservoir jointly by the state and federal government and then complete state administration of the entire irrigation industry. Eventually that is what will be done.

In the meantime 50 per cent of the water appropriations of Idaho today are in excess of actual duty. Fifty per cent of the water taken from the streams of the state and diverted as private and corporate rights never perform duty.

The great drainage problems, such as that in the Nampa-Meridian district, which is now requiring an expenditure of three-quarters of a million dollars, are the result, to a large extent, of excess application of water, the direct result of the inability of the soil to utilize the water applied and make it do irrigation duty.

Had the irrigationists of Boise valley used water as it should have been used that district would not be under the necessity of covering itself with a blanket mortgage to get funds to dig ditches to get rid of the water it persists in applying and which it cannot possibly use—beneficially.

Knowledge of the duty of water and then an administrative authority that will compel use and not waste is what Idaho needs more than anything else at just this time.

It is as reprehensible, as unfair, as criminal, for an irrigationist to permit water to waste through the sub-formation of his field as it is to permit it to run unused through the ditches on its surface.

When he does that he steals, literally steals, from other acres that have an equal right in natural equity and constitutional guarantee with his own, the water they must have to be reclaimed. When he does that he stands between the state and its proper development. No individual has a right, morally or otherwise, to do this. Nor has he a right to assume that God Almighty created water for his ranch and his alone!

Yet that is precisely what the area reduction instead of duty increase recommendation of the irrigation law revision commission predicates.

A recommendation that fixes in the minds of irrigationists the belief that they are possessed of more than a right to beneficial use of water, that they are entitled to an inch, five-eighths, a half—or any other specific volume of water per acre, save the duty as that duty is determined by a competent authority and not by the individual opinion, is vicious in its trouble breeding proclivities.

The thing the water users of Idaho will have to learn is that water is not nor can it ever become private property per se. They must be made to understand that the waters of the state of Idaho are the property of the state and that their use is constitutionally declared (section 1, article 15), and justly, too, to be "\* \* \* A public use and subject to the regulation and control of the state in the manner prescribed by law." They must realize that "First in time first in right" applies only to turn of application and not to duty, that (section 5, article 15, of the constitution): "\* \* \* Whenever the supply of such water shall not be sufficient to meet the demands of all those desiring to use the same, priority of right shall be subject to such reasonable limitations as to quantity of water used and times of use as the legislature, having due regard both to such priority of right and the necessities of those subsequent in time of settlement or improvement, may by law prescribe."

No man in Idaho can hoard water—can possess himself of it and maintain that possession except for actual beneficial use, and the state reserves the right to say how much, when and in what manner he shall use it.

The equations of ignorance or selfishness, acquired or inherent, in the individual compels the necessity of this. When an individual is permitted to determine the extent of his private use of public



property, the principle of organized control is abandoned and inevitably anarchy ensues.

That is the condition of the irrigation industry of Idaho at this time—confusion, chaos, disorders are rampant, strifes abound, hatred and suspicion intervene between neighbors, litigations multiply and shysters feast upon the cupidity and stupidity of the misguided irrigationists like vultures upon the carrion that clutters the field of physical carnage.

It is a terrible indictment, but it is true.

It is the result of legislative wanderings from the great cardinal principles fixed in the state's organic law.

It is the natural sequence of departure from natural equity.

It is the fruitage of a mad scramble to parcel out to private control a great public property, the use of which, if Idaho is to attain her full measure of development, must forever be "\* \* a public use."

What then? Does the commission hope to bring order out of disorder, harmony from discord, peace out of strife, by going deeper into the tangle of misconception?

Would it develop Idaho's wonderful irrigation opportunities by saying, "These may irrigate and those shall not?"

Would it lift its hand in the path of progress and bid it stay the onward march upon a theory that the accident of time gives inviolate right to monopolization by individuals of that which in nature is the just inheritance of all?

The duty of water is as flexible as the supply that is changing forever. It cannot be measured like acres of land in a fixed and permanent amount. It cannot be bound by the signature of a man nor the words of a written deed. It cannot be decreed by a court and ordered the same today and tomorrow, for God and the elements obey neither the judge nor jury nor mandate of man-made law.

The duty of water is service and that alone.

The title to water is use and nothing more.

Why not then, instead of advising constriction of Idaho's irrigation development by seeking to perpetuate the fallacy of rigid title to definite, unchangeable flow, provide a competent administrative authority, representative not of the whim of the individual, but of the rights of the state, to determine upon facts the equitable use and duty as that duty is manifest through need?

Then compel such use of water as will develop the state and secure the rights of all.

## PAN-AMERICAN CONGRESS FOR IRRIGATION AID

The Pan-American Scientific Congress, which held its sessions in Washington in January, devoted some of its valuable time to the subject of irrigation. The sub-section which had this topic on its program finally adopted the following important resolutions:

WHEREAS, The surest foundation for national prosperity is a land-owning, agricultural population; and,

WHEREAS, One of the highest functions of the State is to provide conditions under which its growing population may acquire homes on the land; and,

WHEREAS, There are in all Pan-American countries large areas of unutilized land, the reclamation of which will permit of the necessary expansion within existing territorial limits; and,

WHEREAS, Private development unaided by the State has not yet yielded financial returns such as will induce large capital to continue in this field; and,

WHEREAS, The creation of homes and national wealth in places now waste is of great public importance;

*Be it Resolved*, That the American nations should extend substantial aid in the gradual reclamation of these waste lands as the demands of increasing population require.

*Be it Further Resolved*, That, in formulating a policy for the reclamation of arid and semi-arid lands, it is recommended that the public bear a just part of the expense and that the Nation, the State and the community co-operate with the tillers of the soil in converting worthless lands into productive farms. In such co-operation the Federal Government, either alone or in co-operation with the State, should ascertain the land and water resources of the arid portions of the republic and construct the larger irrigation works, while each State de-

pendent on irrigation for the full development of its agricultural resources should utilize, in the best possible manner, the water made available by the larger works of the Federal Government and should also extend financial aid, either in money or credit, to the smaller works built by corporations, communities or individuals. It should likewise be the duty of the Nation, the State and the community to colonize the vacant lands under completed systems and to remove, in so far as practicable, the handicaps which at present retard the progress of settlement on irrigable lands.

A comprehensive study throughout the Americas of the laws, customs and regulations and practice pertaining to the use of water for irrigation and other purposes, was advocated by Dr. Augustin Mercau, dean of the Engineering Faculty of Buenos Aires, Argentina, and other delegates, and a resolution to that effect was adopted by the section and passed by the congress in the following form:

That each of the American nations appoint a commission to investigate and study, in their respective countries, the existing laws and regulations affecting:

(a) The administrative practice of regulating the use of water.

(b) The adjudicating of rights pertaining to the use of surface and underground water for irrigation purposes.

(c) The distribution, application and use of water upon arid and irrigable lands.

(d) Methods of conservation of surface and underground waters for irrigation or industrial purposes.

(e) And to suggest laws or regulations in the interest of general industry, navigation and commerce.



## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### Oregon

The natural features of Oregon—its topography, climate, rivers, lakes and swamps—and the flow of its streams are described in a report entitled "Surface Water Supply of Oregon, 1878-1910," which has just been issued by the United States Geological Survey as Water-Supply Paper 370.

The public service commission is holding hearings on the complaint filed against the Central Oregon Irrigation Company by the Central Oregon Water Users' Association. The association alleges that the company has entered into contracts with the settlers to supply them with the necessary water, and that its canals and system are inadequate for this purpose. As the project is the largest in the state, and the hearing will pave the way for exercising control by the commission over similar projects, it is regarded as one of the most important ever held by the commission.

The Desert Land Board has asked the government for an extension of time of the State's contract on the Benham Falls Unit of the Central Oregon Irrigation Company's project in Crook county:

Utilization of the waters of the Similkameen river, a tributary of the Okanogan, which in turn is an important tributary of the Columbia river, will reclaim 10,000 acres of fertile land in Northern Okanogan county, Washington. Construction work is far advanced, being about 75 per cent completed, with assurance of completion of the entire system before the 1916 irrigation season begins.

This project, the largest of its kind in Washington or Oregon, under active construction at the present time, is the West Okanogan Valley irrigation district project, the headquarters of which are at the town of Oroville in Northern Okanogan county. The lands embraced in the project form a narrow strip on either side of the Okanogan river and the Great Northern Railway's Wenatchee north branch road, beginning at the international boundary line and extending south to below Tonasket, about 20 miles.

### Arizona

The International Gas Company have received for E. K. Cumming, of Nogales, to be installed on his country property, a centrifugal irrigating pump and motor, direct connected, which is the last call in irrigation machinery. It has a pumping capacity of 800 gallons per minute, and will suffice to cover a large tract of land with irrigation water. The appliance is from the United Iron Works, in Oakland, Cal.

The Casa Grande Water Users' Association at its annual meeting in

Casa Grande in January, arranged for a reorganization, defined its boundaries to include 55,000 acres and voted \$20,000 in a bond issue to clear its indebtedness. The directors elected for 1916 are W. S. Prouty, J. F. Brown, A. Peters, R. H. Mendenhall, M. J. Reid, F. A. Hamilton, Prof. A. V. Vinson, M. Bambesberger and W. J. Schulze. The project to bring together the two ends of the district is well under way. The priority suits must first be settled.

"Arizona Irrigation Calendar for 1916," issued by the U. of A. Agricultural Extension Service is a vest-pocket calendar attractively printed, containing a list of irrigation rules prepared by Prof. G. E. P. Smith, Irrigation Engineer of the U. of A. Agricultural Experiment Station. A copy of this publication will be sent free.

### New Mexico

Incorporation papers have been filed by the Llano Irrigation Company of Questa, Taos county. It is a community affair capitalized at \$10,500.

United States District Judge William H. Pope has appointed David W. Low, receiver of the Berrendo Irrigated Farms Company fixing his bond at \$10,000.

The board of directors of the Pecos Water Users' Association has closed a deal whereby the association takes over the entire business and good will of the Farmers' Irrigated Land Company, of Kansas City, Mo.

### Utah

The farmers of the Ephraim district have expressed their willingness to conclude a contract for the construction of a tunnel through the mountains east of Ephraim, together with diverting works for the irrigation of 4,086 acres of land.

Residents of two counties are contending for the purchase of 30,000 acre-feet of water from the state's Piute reservoir, a delegation from Millard county having entered the lists before the state board of land commissioners. No decision has yet been reached.

### Texas

The officials of the reclamation office laid before the Elephant Butte Water Users' meeting in January, plans which they had prepared looking to construction of the initial drainage unit of the system in the form of a canal to be run from the Rio Grande at Fabens, a distance of approximately three miles, parallel to the tracks of the Southern Pacific Railway. The water users passed a

resolution authorizing and indorsing the steps taken by the reclamation office relative to drainage. The association decided to send President Felix Martinez, Richard F. Burges, attorney for the association, and J. A. Happer to Washington, for the purpose of representing the association in matters of legislation, and primarily with the view of getting certain reductions in the costs to be assessed against the water users for the Rio Grande project.

The attorney general's office, answering an inquiry of the Texas Board of Water Engineers, holds that the Irrigation Act makes the waters of public streams the property of the state, and that, therefore, the state may forbid their waste. But suits for this purpose, it is held, must be instituted by the attorney general and not by the Board of Water Engineers, its function in the premises being merely to advise the attorney general. It is further held that a water user is entitled to get from an irrigating company only such a quantity of water as may be reasonably sufficient to irrigate his land, even though this quantity should be less than the quantity stipulated in the contract. It is held, in other words, that a contract for the delivery of more water than is necessary cannot be enforced. The Board of Water Engineers is to determine, in the first instance, what this reasonably sufficient quantity is.

John T. Beamer of Chicago and associates who recently purchased the irrigation system and a tract of 100,000 acres of land belonging to the American, Rio Grande Land & Irrigation Company for \$3,500,000 are making improvements to the irrigation plant at a cost of \$250,000. It is stated that the canal and ditch system will also be greatly extended to bring practically all of the big tract of land under cultivation. The American, Rio Grande Land & Irrigation Company was composed of St. Louis, Mo., men and the irrigation system which it constructed near there is said to have been the largest privately owned land reclamation and water supply project in the United States at the time it was built. Since then it has been considerably extended. The water is obtained from the Rio Grande by means of gigantic pumps.

F. H. Carson, a San Antonio engineer, announce that work probably would be resumed soon on the great irrigation project at Rio Bravo, Mexico, 55 miles west of Matamoros, where a Mexican concern is preparing to irrigate about 80,000 acres of land. The system was well on the road to completion when the revolution stopped work two years ago. Carson has just returned from a visit to the plant, made for the purpose of obtaining a report on its condition



to be considered by the owners in rehabilitating it. He says damage is comparatively light.

### Nebraska

At the annual meeting in January of the Dawson County Irrigation Company, in Lexington, a resolution was passed heartily approving the construction of the high-line canal from the Platte river at Gothenburg southeast on the tableland of Holdrege, Axtell and Minden. The company also authorized the purchase of a large amount of water from the government for irrigation purposes during the months of July and August.

### Washington

Dr. C. R. McKinley has made arrangements with the Kennedy Construction Company to investigate the Brewster Irrigation district. He says that during the five years, he has been a member of the district board prospects for the building of the big canal, which will water thousands of acres around Brewster, and for the floating of a bond issue, have never been so bright.

Twelve homestead tracts in the Outlook and Benton districts will be drawn for in the U. S. Land office at North Yakima, Wash., Feb. 7.

Senators Jones and Poindexter and Representative Dill have conferred with Indian Commissioner Sells in regard to the west Okanogan irrigation project. Fifteen hundred acres of land allotted to the Colville Indians fall under the project. There is no provision for making them pay their proportionate share of the cost. Dill has introduced a bill appropriating \$105,000 to pay this share. The Indian office is favorable to this bill.

## Here's Something New about California For You

Two parties of Eastern farmers saw California under my personal escort last fall. It was not a land-selling trip—it was solely for investigation.

We were guests of over forty local communities. Their Chambers of Commerce and Boards of Trade provided the automobiles and guides who showed us the agricultural activities in their neighborhoods.

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At the session of the Washington irrigation institute in North Yakima, Jan. 11, Governor Ernest Lister favored an appropriation by the legislature of \$1,000,000 to aid the development of irrigation projects in the state approved by the state's engineers. He opposed extending the state's credit in guaranteeing either principal or interest on irrigation bonds, but favored direct appropriation to a revolving fund, the money to be returned by farmers.

### Idaho

The Idaho state land board has granted a petition filed by the Payette-Boise Water Users' Association to the effect that all state lands on the Boise project described in a petition, be placed on sale on or before April 11. There are about sixteen thousand acres belonging to the state and the petition stated that these lands are a harbor for rabbits and other pests. The petition further stated that about 6,650 people are menaced by these lands in their present condition, and the petition asked

that they be put on sale in order that they might be settled as early as possible.

The new directors of the Payette-Boise Water Users' Association are E. Jordan, V. C. Sparks, L. J. Magee, J. H. Kelin, E. Jordan, J. W. Brandt, W. E. Wood, V. C. Sparks, C. M. Rankin, C. F. Oellian, D. R. Hubbard, Sam Hunt, A. C. Johnson. Serious charges were made in connection with the recent purchase of water rights. An investigation is in progress.

Recommendations for an Indian irrigation project to embrace 30,000 acres on the West Shoshone reservation in Idaho will be made to the federal government in the near future, according to Henry W. Dietz, in charge of the western division of Indian irrigation projects.

The bondholders of the West End Twin Falls Irrigation Company have been granted a further extension of six months in which to complete their contract.

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## IDAHO ON IRRIGATION LEGISLATION

(Continued from page 55)

the power to fix the duty of water from year to year in the respective irrigation districts of the state, and in conformity with the general laws of usage.

"The commission, in its recommendations to the governor, suggested that such a board be created, and that it be composed of three members. A board of this kind should be non-partisan and men selected upon it should be experienced in the problems of Irrigation.

## Wyoming

At the annual meeting of the Water Users' Association on the Shoshone project, at Powell, President Dowling reported that the government had turned down the proposition for a legal water users' association. Letters from the interior department were read which stated in effect that the interior department was compelled to recognize any association of water users under the reclamation project law whether legally organized or otherwise. Directors for the year are Mr. Dowling, president; I. E. Ferguson, secretary-treasurer; F. R. Griffith, D. L. Heaston, Abbot Williams, G. C. Dillavan, Dr. M. D. Barney.

Thirteen thousand acres of rich land in the Goshen Hole country is now being placed under irrigation by the Hawkes Springs Development Company. The project is to be enlarged later.

Thousands of Wyoming farmers living on irrigated government lands will be forced to pay taxes on the equity in their holdings, if the next legislature enacts the law that was recommended by the county assessors of the state.

## California

There is much discussion of the advisability of forming a Kings river water storage district in Central California.

The Modesto irrigation district has offered the use of its main canal southeast of Oakdale to the Waterford Irrigation District for the sum of \$275,000.

The Oakdale Irrigation District is planning extensive development and on January 27 contracts were let for improvements aggregating \$100,000.

The University of California is conducting extensive experiments in alkali reclamation on the Kearney ranch near Fresno.

Whether or not the Kings river waste water—600,000 acre feet per year—shall be conserved was placed squarely up to the irrigationists and property owners in a big mass meeting held in Fresno late in January. At this meeting action will be decided upon whether or not there shall be an organization for the building of the \$6,000,000 reservoir system at Pine Flats and Mill Creek. One million acres are affected. After a year's work the issue has come to a crisis.

## AUSTIN TRENCHING AND BACK FILLING MACHINE


The necessity of taking care of the seepage water in irrigated lands is a problem that faces all irrigators throughout the West. The popular but misleading idea that the mere bringing of water to the land is all that is necessary to effect transformation from desert to crops was long ago dispelled by the fact that hundreds of thousands of acres have been made useless by seepage, and it has been demonstrated that irrigated tracts must be provided

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with some means of carrying off the water that settles in the lower levels, otherwise the ground water rising to the surface, carrying with it deleterious substances, kill not only small grain crops but valuable orchards as well. The land owners have realized these facts and are at work to remedy this evil.

The illustrations herewith shown of operations in New Mexico, where this condition of affairs exist, show that where new work is being developed the drainage feature is taken care of by putting in drain tile prior to the time that the water is turned on the land.

Approximately 400 miles of tile drains is being laid near Roswell, New Mexico, and the contractors, the Lana Construction Co., of Council Bluffs, Iowa,

are using the Austin Drainage Excavators for this huge task. In addition to the trenching machines, all of the back filling is done with Austin back fillers. It is reported that these machines are giving excellent satisfaction. All those connected with the work are evidently pleased with the rapid progress which is due principally to the steady speed of the excavating machinery. This is a big item on a job of this magnitude.

Mr. H. W. Vauchelet is the engineer for the district; the contract was originally let to W. S. Dickey Clay Mfg. Co., of Kansas City, Missouri, and this company is furnishing pipe for the entire job. The F. C. Austin Drainage Excavator Co., of Chicago, will furnish further details concerning this character of work.



Austin Backfiller With Austin Trenching Machine in Distance

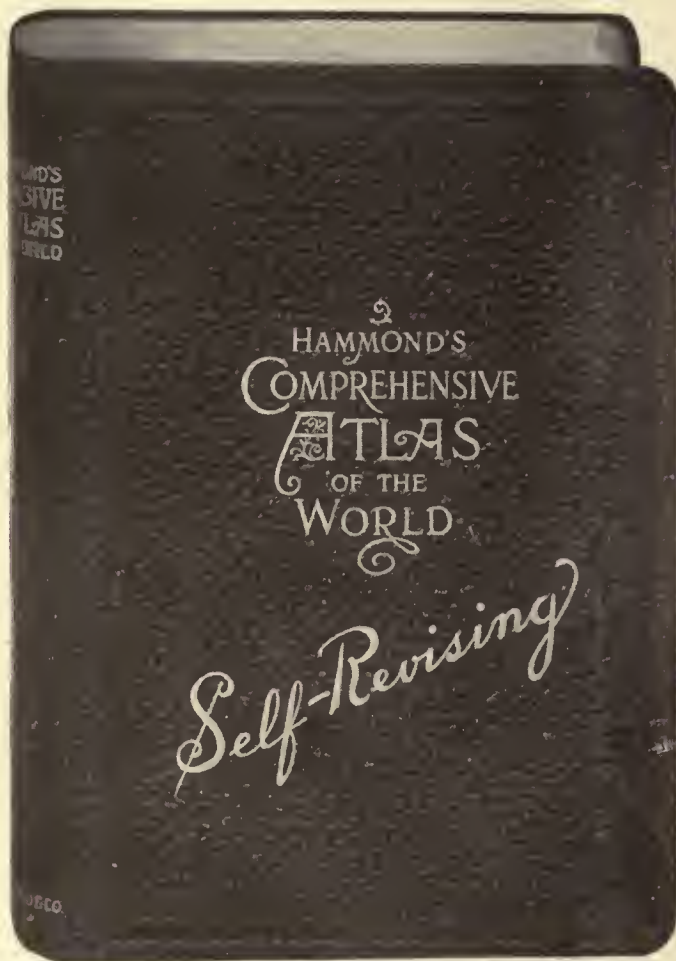
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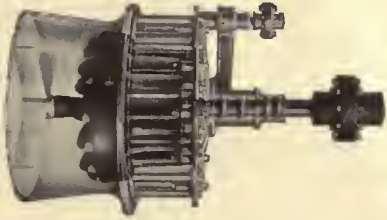
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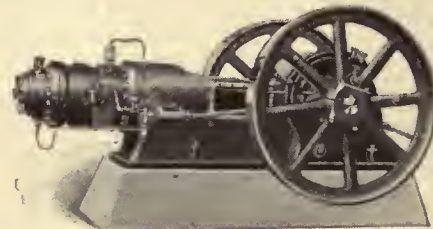
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Thirty-First Year

# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, MARCH, 1916.

No. 5

## THE IRRIGATION AGE

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**Plenty of Water for Purposes of Irrigation** The indications point to another phenomenal year in the irrigated farming systems of the west. In Colorado there is more snow than usual at this time of the year in the mountains. In the far west the floods have done great damage, but in the end the soil will give back many times the amount lost by wreckage.

In the northwest, too, there is a report of heavy snow packs in the ranges, in some sections almost glacier-like. In Wyoming and stretching south to Estes Park the snow is at present two or three feet deep and packed almost to the consistency of ice.

While this may mean floods for a brief period, it means, above everything, an ample supply of water for farm irrigation.

**Bond Issues for Irrigation Sell at Premium** In the last issue of THE IRRIGATION AGE we cited ample evidences of a return of prosperity for the irrigation bond market.

But at that time there were only indications of this much-desired result. During February the market assumed something of the proportions of a stampede. In Los Angeles, when the bonds of the San Fernando district were offered for sale, there was

not alone keen competition, but in the final outcome a premium amounting to over \$24,000 was obtained for the part of the issue that was disposed of.

In the sale of the Cottonwood district bonds in California the bidders were numerous and a very satisfactory premium was obtained.

In another part of this issue will be found the record of these and other bond sales of the month.

In this connection the purchase of the Imperial Valley project by the Southern Pacific assures the most satisfactory outcome for all the troubles of the past five years.

### Write Us a Letter on the "Cost" Question

The "cost" question is agitating the settlers under all the government reclamation projects. THE IRRIGATION AGE believes that in the end there will be adjustments that will be entirely satisfactory from all viewpoints. And in order that there may be an exchange of views without bitterness THE IRRIGATION AGE opens its columns for the publication of articles pro and con. These letters or articles must be brief and to the point. They must not be rancorous, for we do not believe that there is any desire to do any settler an injury. There are sane and solid arguments that

are as varied as the needs of each reclamation project. We realize that the problem is one that requires for its adjustment a broad view—one that will settle in its scope all the objections—differing to an extent in each district. And these articles, if they are argumentative and not abusive, will do much to bring about an amicable spirit, which, after all, is the prime requisite in the settlement of any dispute.

---

**"Progressive Agriculture" Well Worth Reading** Prof. Hardy W. Campbell of Lincoln, Neb., has just issued his book on what he terms "Progressive Agriculture," with the sub-caption, "Tillage, Not Weather, Is the Greatest Factor in Controlling Yields."

It is the epitome of Prof. Campbell's long years of experience in the arid and semi-arid regions of the west. For thirty-five years he has been experimenting, and his work shows decided progress during all the trying periods of his task. He asserts that the past four years have seen his task come to fruition. His book is divided into seven heads or general classes, viz.: "Planning," "Preparation," "Plowing," "Physical Condition," "Keeping Up Tillage," "Planting," "Cultivation." The book is filled with a mass of interesting details, all simply related, so that he who runs may read and understand.

It is a book that should be in the hand of every farmer who has to depend for results on a minimum of rainfall, for it is not alone a wonderful guide, but every line of it is an inspiration to the man who is struggling to make a "winning in the west."

---

#### Interest and Rural Credits

Figures that will throw light on the charges paid by farmers for personal or collateral security in various parts of the United States were given out by Carl W. Thompson, specialist in rural organization, U. S. Department of Agriculture, in his address before the third national conference on Marketing and Farm Credits, in session at the Hotel Sherman, Chicago, November 29 to December 2, 1915.

Prof. Thompson also pointed out the factors that cause variations in these charges. He showed the relations of existing banks of this class of farm loans and considered certain matters with regard to this class of rural securities.

The average total cost, says Prof. Thompson, including interest and extra charges, varies from 6½ per cent in New England to between 10 and 20 per cent in the Southern or Rocky Mountain states, and he declared this to be the result of figures obtained by the office of markets and rural organi-

zation of the United States Department of Agriculture. He further stated that in those states of New England where the total cost is lowest (about 6½ per cent) the extra charge on the average is only about ½ to 1 per cent; in the more highly developed farming regions of the corn belt, where total costs range between 7 and 8 per cent on personal and collateral loans, the average extra cost is less than 1 per cent. In those states of the south and west that have the highest average for total costs the average extra charge often ranges between 2½ and 3½ per cent. Similar variations are also found within many states.

In Eastern Nebraska, so states the professor, the average total cost for such loans is 8.3 per cent, while in Western Nebraska it reaches 10.6 per cent, illustrating contrasts in interest rates that generally obtain as between the relatively highly developed agricultural areas with abundant rainfall and the semi-arid farther west, and emphasizing the importance of climatic conditions as one factor affecting interest rates. Prof. Thompson also tells us that no factor affecting interest charges is of greater importance than the method and system of farming. The best credit will always tend to go to those farming regions having safe and regular incomes from year to year.

Preference in credit, it appears, will be given where population is fairly stable, rather than shifting, and another important feature to all farmers is that it tends toward sections where farming is conducted by owners rather than tenants.

These thoughts are presented to our readers as preliminary to a series of articles on rural credits that will appear in future issues of THE IRRIGATION AGE.

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#### RUSSIA'S BIG DRAINAGE PROJECT

Russia will begin the reclamation of 30,000,000 acres of swamp land as soon as the war is ended. The drainage and road making all will be done by American machinery and after American methods.

Theodore Kryshstofovich, representing the Russian minister of agriculture, is authority for that statement. In an interview in Chicago a few days ago he explained in detail the tremendous reclamation scheme that has been mapped out by the Russian government.

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#### UNIVERSITY COURSE IN IRRIGATION

A new course in mine and irrigation law has been introduced into the curriculum at the George Washington, D. C., University Law School. The course is particularly designed for students who contemplate practicing law in western states. The subjects are being taught by Judge W. R. King, chief counsel for the reclamation service and at one time chief justice of the supreme court of Oregon.



## GIVING THE SETTLER ON IRRIGATION PROJECTS A SQUARE DEAL

(As analyzed by Western experts)

It is generally agreed by colonization experts who have made a study of the agricultural situation in the West and Southwest that the usual methods of inducing new settlers to come and take up land on various projects have been a failure. The causes for this failure are:

1. The settlers are lured to the new country by advertising which grossly exaggerates the local agricultural conditions and possibilities.

2. On arrival, the settlers are frequently sold land in a manner disadvantageous to them, such as land not having first-class water rights, affected with alkali, price too high from an agricultural production standpoint, area too small for profitable extensive farming by the farmer of average ability, or the settler is induced to make a purchase when he has insufficient capital or without reserving enough working capital.

3. Lack of experience with local farming conditions is apt to lead the settlers to make costly failures at the start. They do not know what crops to plant, how or when to plant them, are unable to plan the development of their ranches to best advantage, and are unfamiliar with irrigation or dry-farming methods.

4. Lack of credit facilities, organization, and marketing system are serious handicaps to be reckoned with.

It is encouraging, therefore, to learn that one community in the Southwest has at last recognized the seriousness of this situation and has taken definite, business-like steps to remedy it. For more than six months the Elephant Butte Water Users' Association, in co-operation with the business men of Las Cruces and the Rio Grande Valley in New Mexico, have had in successful operation a plan which bids fair to make the Elephant Butte project the most successful of any of the reclamation projects in the United States. There has been organized what is known as the Immigration Bureau of the Elephant Butte Water Users' Association, in charge of a secretary. This bureau is supported by funds from the Water Users' Association and the business men. The bureau also employs a sales agent, who handles practically all the sales of farm lands under the project. When the sales agent was first appointed he immediately commenced listing all the lands that were for sale in the valley, not asking for an exclusive option at all, but merely getting the signatures of the property owners, agreeing to sell their lands at a stated price to anyone whom the immigration bureau might bring to them, and agreeing also to pay a commission of 5 per cent for such sales and to furnish an abstract of title. One feature of the plan is that lands are not accepted for listing on which the owners desire to put the price greater than their agricultural value. As the secretary of immigration, Mr. H. B. Link, states, "The idea proved exceedingly popular, and

our listing included more lands than all the real estate men put together were ever able to show in this valley. . . . We always try to arrange things so that each man will have a cash working capital instead of paying all his money as a first payment on his land. As a result of a campaign that we inaugurated when we started the work, most of our lands are listed with us with the provision that deferred payments shall draw but 6 per cent interest. In addition to this, we have access to the maps and statistics of the U. S. reclamation service, which cover every farm unit under the Elephant Butte project. We can thus ascertain the contour of each property, the exact acreage, and other similar and valuable information. We also have access to the books of each community ditch, and determine in advance whether ditch rentals and water taxes have been paid, and otherwise protect the purchaser in every way possible.

"Mr. J. F. Findlay, the sales agent, at his own expense, provides a Ford touring car, which he maintains, and in this he carries prospective purchasers to see the lands that are for sale. When a man finds something that he likes and which we can approve, we take him then direct to the owner, and the two men can make their deal, each knowing the exact terms which the other is receiving and each one secure in his confidence that no one is being swindled.

"In the six months that this plan has been in operation the commissions from our sales have been more than enough to pay the expenses of Mr. Findlay's department, so that we can add his salary to the amount that we can spend for advertising. These advertisements are placed in mediums of proven worth, our activities at present being largely confined to the agricultural papers of the corn and wheat states.

"Our plan has won the commendation of the U. S. reclamation service, as well as the colonization departments of the railroads. Its heartiest and sincerest commendations, however, have come, I am glad to say, from the homeseekers whom we have handled under this plan."

Another feature of the Elephant Butte plan is that the county farm advisor has his office with the immigration bureau, and new settlers in this way are enabled to secure the advice of the county farm advisor in laying out their ranches and otherwise starting off on the right track, so that the usual costly mistakes are avoided from the very beginning. Thus everything is done to help the new settler make a success of farming and so become "an asset rather than a liability to the community."

It is interesting to learn that the example of the Elephant Butte water users is now being followed by the Carlsbad water users in New Mexico. The work at Carlsbad is just beginning, but will probably be conducted along the same lines as that at Elephant Butte.

## LAKE TAHOE ON THE TRUCKEE-CARSON IRRIGATION PROJECT

Here is the marvelous record of the Truckee-Carson project for 1915, as prepared by the officials of the Reclamation Service:

Number of people on the farms, 1,986; number engaged in agricultural work, 779; acreage previously cleared and leveled, 30,975; additional acreage prepared in 1915, 1,965; total invested in land and all improvements, \$2,992,822; present value of farms, with improvements, including livestock and equipment, \$3,831,905.

During the thirteen years that have elapsed since the project was started, more than \$6,000,000

Concrete dam for diverting water from Truckee river into Truckee canal.

Carson diversion dam, six miles below Lahontan dam, and headworks of Northside and Southside canal systems.

One hundred and four miles of main canals with numerous concrete structures.

Four hundred and twenty miles of laterals with concrete and wooden structures.

One hundred and seventy-eight miles of surface drains.

Four miles of tile drains.



World famous Lake Tahoe, beauty spot of the Sierras. Great natural reservoir, source of Truckee River, furnishing water for power and irrigation near Reno and on Truckee-Carson project.

have been expended in constructing an efficient, modern, and permanent irrigation system. The system is about two-thirds completed, and the features already finished and in operation comprise the following:

Concrete dam for controlling outflow from Lake Tahoe.

Lahontan dam and reservoir for storage of 290,000 acre-feet of water, on the Carson river eighteen miles above Fallon.

Truckee canal, thirty-one miles long, extending from Truckee river near Derby, Nevada, to the Lahontan reservoir.

Hydro-electric plant in concrete power house below Lahontan dam, capacity 2,400 horsepower.

One hundred and twenty-eight miles of telephone line.

Plans for completion of the project involve the construction of additional storage reservoirs on both the Truckee and Carson rivers, and extensions of the present canal, lateral, and drainage systems for additional units. The first feature undertaken was the Truckee canal, extending from the Truckee river above Derby, 31 miles across the low divide into the valley of the Carson and emptying into the reservoir just above the Lahontan dam. Construction work was started in 1903.



## SOME KANSAS RESULTS OF PUMP IRRIGATION

Some very interesting figures have been compiled by irrigation reports covering the results of experienced farmers, by means of pump irrigation, in Kansas.

Electricity is the most satisfactory power for pumping water for irrigation. Motors cost about \$10 per horsepower, and it requires from 25 to 50 horsepower on an average farm of a quarter section. The maximum lift in the first bottom is 25 feet and this costs about \$1.50 per acre-foot of water. As you go back from the river the lift increases, but some of the best net results obtained by the farmers have been on lands with deepest lift, as they have richer soils.

The Garden City district is the home of the sweet clover king, E. G. Finnup. Only a few years ago sweet clover was thought by most farmers to be a pest. Mr. Finnup was one of the first to be impressed with its value. The seed commands a good price, and he shipped from Garden City the first carload ever moved. Today he devotes 5,000 acres of the immense Finnup farm to sweet clover.

It is a leguminous plant and the best of them for gathering nitrogen. It is also rich in humus, and tests have been made which show that sweet clover grown on one acre will furnish as much nitrogen and humus as twenty-five tons of average manure. It is especially good as a fertilizer crop



From the underground flow near Garden City, Kansas.

for orchards and is equally good for cattle, horses and mules. The average farmer can properly farm 150 acres here if he diversifies and conducts on same plan as the big farm. He will, of course, have to have help during the busy seasons.

Well located improved land in the bottom with ditch right, also pumping plant and buildings, sells for \$85 to \$150 per acre. In the higher sections no developed lands are for sale, undeveloped lands selling for \$25 to \$35 per acre.

### CALIFORNIA'S IRRIGATION LAW ANALYZED

A very interesting analysis of the California Irrigation law has just been prepared by W. P. Boone, of Berkeley. It will be remembered that the act was passed at the last session of the California legislature and became effective in August, 1915. It provides for a commission of three members, to be appointed by the governor. The commissioners receive \$10 per day for the time actually employed, to be paid out of the proceeds raised from the district for which they may be employed at the time.

"Such a commission serves all the districts that may be formed under the said act within the state, and this was adopted to permit such areas as the Kings river and the Iron canyon project in the Sacramento valley to work under. To form such a district requires a petition signed by land owners representing a majority of the acreage and also provides for sub-districts within the main district. After the district is formed there is to be an assessor appointed by the commissioners, who shall have no financial interest within the district, and he shall assess to each tract of land in accordance with the benefits it is to receive, and which assessment becomes a lien and a charge against such land

with the usual methods of enforcing payment thereof, and also provides that land that may be reclaimed from a swamp or overflow condition by means of dams and other works shall pay its just portion of the charge, to be ascertained by the assessor.

"It also provides that the water stored for irrigation shall be allotted to the various subdivisions in accordance with their needs and the total charge against such sub-divisions will be fixed by the proportion allotted to it that it bears to the whole costs.

"The irrigation districts now in existence may become a subdivision of a district and remain and operate as an irrigation district. The question whether or not an irrigation district shall become a part of such district will be determined by an election held for that purpose.

"This law also provides for bond issues upon a land owner's vote and it further provides for co-operation by the state and national government and contemplates aid therefrom in construction of such works as would be required on Kings river and the Iron Canyon project on the upper Sacramento.

"The usual rights of the individual land owner to have his 'day in court' are provided for, but thereafter the acts of the commissioners are final and valid under the terms and wording of the act."



## REVIEW OF THE WORK ON THE RIO GRANDE IRRIGATION PROJECT

The greatest of all the government irrigation projects is now within a few months of completion. During the coming fall El Paso will celebrate its opening with an international exposition. A review of the project is therefore of great interest now.

The Rio Grande project, as it is now outlined, consists of a chain of valleys lying along the river, from the Elephant Butte dam, in New Mexico, to the lower end of the El Paso valley, near Fabens, Tex.

The Palomas valley heads about six miles, the Rincon valley about twenty-four miles, the upper Mesilla sixty-nine miles, the lower Mesilla eighty miles and the El Paso valley 120 miles below the dam.

The Palomas and Rincon valleys comprise 27,000 acres, the two Mesilla valleys 83,000 acres, and the El Paso valley 45,000 acres, making a total area to be irrigated in the United States of 155,000 acres. In addition to this, under international agreement with Mexico, the United States guarantees to deliver to Mexico, at the International dam, near El Paso, 60,000 acre-feet of water per annum.

At the present time about 60,000 acres are in cultivation, composed of small strips in each of the valleys. The government has built a diversion dam at Leasburg, N. M., which diverts water to a part of the Mesilla valley, and is now building a diversion dam opposite Mesilla park.

In the El Paso valley the government owns and operates the Franklin canal and is engaged in extending and improving this. During the last irrigation season the Elephant Butte dam was in service, and at this time has left over from last season's supply about 300,000 acre-feet of stored water.

This project has been slow in development, owing to international complications, which were not entirely settled until 1907. The development of the project depends almost entirely upon the storage of flood water, as the lands under cultivation in southern Colorado and northern New Mexico absorb practically all of the natural flow, leaving the river dry for long periods in the hottest months.

The Elephant Butte dam site is about 1,000 feet down stream from a volcanic mountain, known as the Elephant Butte, and twelve miles west of Engle, N. M. The river at this point flows through a sandstone gorge about 400 feet wide at the original river bed and 1,200 feet wide at the high water mark of the reservoir.

Reconnaissance surveys and borings were started in 1903, but it was not until 1910 that actual construction was started on the spur railroad, which extends twelve miles from a junction with the main line of the A. T. & S. F. railway to the dam site. The ruggedness of the country is shown by the use of 12-degree curves and 3.7 per cent grades in the construction of this railroad.

Nineteen miles of heavy wagon road construction was required. These roads are constructed with maximum grades of 11 per cent and there is

little of them that is not on grades of at least 6 per cent.

Construction on the dam itself started with the completion of the flume, in November, 1912, used to carry the river around the dam site. This flume was 1,200 feet long, 46½ feet wide on the bottom, 58½ feet wide on the top and 16 feet deep. A drop of over 12 feet at maximum flow was allowed at the intake to permit the incoming water to gather velocity.

The flume would carry 20,000 cubic feet of water per second easily, and could have been forced to carry nearly 30,000.

Where the flume crossed the dam site a section of the main dam was constructed, so that the flume structure at this point is now a part of the dam. It was necessary to excavate 81 feet below the old river level before a foundation was found for this, and 25,300 cubic yards of concrete was placed in this section alone. As soon as the river was diverted through the flume excavation started for the main structure.

The only sand and gravel in this vicinity is in the bottom of the river, and the only available store place for sand was at the railroad level, 180 feet above the river, consequently it was necessary to hoist the sand and gravel from the river to the railroad, load it on cars and transport it to a place where it could be stored and reloaded when needed.

To do this, three cableways were erected, stretching from one side of the cañon to the other. These cableways are of 1,400 feet clear span. The main cables are 2¼ inches in diameter and 1,700 feet long, and are anchored at each end to massive reinforced concrete anchorages. On the east side they are passed over 80-foot and at the west over 125-foot towers, so that they swing 260 feet above the original river bed.

It was supposed from the diamond drill records that a good foundation would be encountered at a depth of about sixty feet below the river bed. It was necessary, however, to go 101 feet below before the material was satisfactory.

The total excavation required for the dam will amount to 600,000 cubic yards, of which 161,000 cubic yards were stored for use in the concrete and the rest wasted. A large percentage of this waste was shale and rock, encountered below the sand and gravel.

In June of 1913 a part of the foundation was ready for the first concrete in the main dam, and since that date concrete has been going in every working day. All concrete is mixed in one building, using the sand excavated from the river, sandstone from three large quarries and "sand cement."

"Sand cement" is a comparatively recent development which has been used in the Arrowrock dam, Lahontan dam and this one. It consists of commercial cement, mixed very intimately with finely ground sandstone, granite or basalt.

(Continued on page 74)



## WHAT IRRIGATION DOES IN THE GREAT SAN JOAQUIN VALLEY

In the Sierra Nevada mountains the sources of the San Joaquin river rise, and they flow out of so many tributaries, and in such great abundance, that, from the very base of the range, the water is sufficient for the uses of agriculture. Northward, more tributaries come in from the Sierra Nevada Range, and more irrigation systems flow abundant water all the way—this for 250 miles, until the San Joaquin joins the Sacramento.

Of the counties in the greater valley only Kern, Kings, Tulare, Fresno, Madera, Stanislaus, Merced

plum, apricot, almond, English walnut, and other orchards of deciduous fruit. There is diversified agriculture here, too.

At Fresno, county seat of Fresno county, is the center of the world's greatest raisin district. Here five-sixths of the raisins of the United States are grown. It is a district of fruit packing-houses, of vineyards, of wineries, of orchards, of dairy farms. Surrounding Fresno lies a great area of intensive cultivation, and the homes, set in the midst of flower gardens and foliage, are of surpassing beauty. Out-



A farm showing the luxuriance of growth in the San Joaquin valley, California.

and San Joaquin lie in the basin of the San Joaquin Valley. However, without the others, which lie in the mountains, there would be no water for irrigation, no streams for electric power, no forests for lumber, no mines, no marble. So the mountain counties are a part of the great whole, which makes the San Joaquin watershed habitable and productive.

In Tulare county oranges, lemons, and grapefruit are grown. Citrus fruits grow on the floor of the basin, also, but not so well, or of such superior quality. However, this soil is great for diversified agriculture. From here on, even into Fresno county, east of the enterprising town of Reedley, are citrus orchards.

In other parts of Tulare county are peach, pear,

lying, lie diversified agriculture and livestock ranches.

San Joaquin county is famous for peat lands in the river delta, and for fertile upland. In this county intensive agriculture is practiced as in no other part of the valley. The peat soil is so rich that skilled gardeners pay fabulous prices for the use of small plots. In other parts of the county are grown deciduous fruits, wheat, corn, oats, barley, rye, rice, alfalfa, and forage. It is a great dairy county as well. Tidewater comes up to Stockton, the county seat, and, daily, the gardeners send their products of celery, potatoes, asparagus, cabbages, tomatoes, lettuce, radishes, etc., to San Francisco, Sacramento, and other markets, by steamboats.

### IMPERIAL VALLEY PROJECT SOLD

In the presence of several hundred persons, composed, in the greater part, of men who have fought the battle with the desert which has been waged since the Imperial Valley project first was conceived, Col. W. H. Holabird, receiver of the

California Development Company, on Feb. 8, at El Centro, California, sold the properties of the company, which form the irrigation system of the Imperial Valley, at public auction to the highest bidder, the Southern Pacific Company, whose bid was \$3,875,000.

## MAKING A FARM PAY IN THE SHALLOW WATER SECTION OF KANSAS

The farm of J. W. Lough is a fair example of what may be accomplished by intelligence and industry in the shallow water area of Scott county, Kansas. He has lived in the county for thirty years, although the shallow water was discovered only a few years ago. He has a herd of about 420 cattle; 120 two-year-olds and the remainder one-

through the winter. He also grows abundant crops of alfalfa, watering the meadow by pump. Likewise, he waters his other fields. His market-garden is the pride of the family and of great profit. However, shallow water is not necessary for an abundant family garden here. The windmill, even on the upland, affords sufficient water to nourish to garden



Hogs and alfalfa on the J. W. Lough irrigated farm, Scott County, Kansas.

year-olds. He also has 400 head of hogs, and great flocks of turkeys and chickens. In 1915 his wheat ran from twenty to forty-four bushels per acre. He also grew Indian corn, yielding fifty bushels per acre. His sorghum crops were great; the kaffir and milo running up to sixty-five bushels per acre. By the sorghums, his cattle and hogs are sustained

until the end of the season. In the shallow water area, if a farmer has a pump everything is kept green until frost, and, in September and early October, "all hands and the cook" are kept busy gathering yellow pumpkins and squashes, big cabbages and late potatoes.

(Continued from page 72)

In this case sandstone is used, 50 per cent sandstone, 50 per cent cement, resulting in a product considerably cheaper than straight Portland cement, yet amply strong for the uses to which it is applied.

To prevent overtopping of the dam when the reservoir is filled with water, a spillway 300 feet wide is provided on the west side of the cañon, which is of the O. G. overflow type, with four ten-foot circular conduits through it, controlled by cylinder gates, to further increase its discharge capacity and also to handle the upper ten feet of the reservoir for irrigation purposes.

The spillway will be crossed by a five-span concrete bridge, which will connect with the main dam and give a sixteen-foot roadway from one side of the river to the other, across the top of the dam, a distance of over 1,600 feet.

Another feature of this work was the construction of an earth dam across a low place in the hills west of the main dam. This "dyke" is forty-eight feet maximum height, 1,850 feet long and contains 164,000 cubic yards of earth and rock.

The Elephant Butte dam is of the gravity type, that is, owing to its weight and shape, it would neither slide nor turn over, due to water pressure.

The foundation is drained to eliminate any uplift and the water face is painted with a one-inch coat of pure cement, to add to the water-tightness. The maximum width at the base is about 215 feet, and the top will be provided with a sixteen-foot roadway.

The outflow of water is controlled by twenty gates and valves, discharging into twelve openings that lead clear through the dam. These gates are all controlled by water pressure, which will be furnished by a small hydro-electric plant.

The main dam will contain 610,000 cubic yards of concrete—571,000 cubic yards are now in place—which, using only one-half the usual amount of Portland cement, will require 1,220 car-loads of 200 barrels each. The dam is built up in blocks, dovetailed one into the other, in order that changes in temperature will not cause cracks and consequent leakage.

The dam will be completed during the first half of 1916, and will cost, in round numbers, \$5,000,000.

**SEND \$1.00 FOR THE IRRIGATION AGE  
ONE YEAR AND THE PRIMER OF  
IRRIGATION.**



## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### Arizona

Irrigation companies are hereafter to be considered as public service corporations and must give service to all applicants under the regulation, as prescribed by the state corporation commission, according to a decision handed down by a state supreme court in the case of the San Carlos Canal & Irrigating Company.

Candidates for the next state legislature will be pledged to vote for a state water law according to a number of prominent irrigationists. A bill providing for an irrigation commission consisting of the governor, corporation commission and state engineer was defeated at the last session.

### California

The plan to make the Orland project the site of the federal settlement project and try-out of rural credits seems likely to be realized in the near future. At a conference held a few weeks ago in Sacramento with Governor Johnson, the plan was explained by Dr. Mead to the governor, the university president and farm school head.

The trustees of the Sunnyside Water Users' Association have fixed the maintenance rate for the coming season at 80 cents for the first two acre feet, 25 cents for the third and 60 cents for the fourth, and all over that 80 cents.

The way for the beginning of the construction of the system of the Anderson-Cottonwood irrigation district is now clear, as Stephen G. Roycroft, president of the board of directors, has obtained the approval of the state board.

Residents of Fairbanks and vicinity have decided to organize a Wright irrigation district. Carmichael Colonies, Fair Oaks, Orangevale, Citrus Heights, Cardwell and Rosedale districts will be asked to join, forming one large district, but if the other districts can not see their way to enlisting in the movement, Fair Oaks will probably form a district of its own.

The State Water Commission has notified the trustees of the Madera Irrigation Bureau that the application of the Panoche Water Company for 1,000 cubic feet of San Joaquin river water was filed by E. F. Treadwell, attorney for Miller & Lux, last summer. A hearing on the same, at which protestants may appear, will be held in the near future.

Sufficient names have been obtained to the petition asking an election on the organization of the Thermalito irrigation district, according to the announcement made by the executive committee and the petition will be presented to the board at the March meeting. The district, as outlined,

includes 6000 acres of land, or over six times as much acreage as is now devoted to productive uses in Thermalito.

Guy C. Earl, attorney of San Francisco, brother of E. T. Earl, owner of the *Los Angeles Express-Tribune*, has recently had a 16-inch well drilled on his ranch at Palmdale. He has installed a Layne & Bowler turbine centrifugal pump in the well, due, no doubt, to the very satisfactory results obtained with this same make of pump on his brother's ranch at Palmdale.

Federal Judge Oscar E. Trippitt of Los Angeles and his brother-in-law, Clay Larimer of North Dakota, have recently had a thousand foot well drilled on their ranch southeast of Los Angeles, formerly a part of the Tweedy Ranch. A new Layne and Bowler turbine centrifugal pump has been installed and the owners are very much pleased with the results obtained. This tract is leased to truck growers and makes a valuable addition to the city's vegetable supply. The large pump installed was manufactured in Los Angeles.

Under foreclosure granted the bondholders of the Kuhn syndicate by a decree issued in the federal court in San Francisco, the real and personal property of the Sacramento Valley Irrigation Company, except the water system, was sold on Feb. 5 at noon, by public auction in Wil-lows.

The decree of foreclosure called for \$12,000,000, of which a mortgage for \$5,000,000 was on the real and personal property and \$7,000,000 on the bonds, stocks and mortgages of the company. Attorney George R. Freeman for the bondholders bid in the property of the company for \$1,631,663, and bonds, stocks and mortgages for \$720,000.

Provision for the exemption of the irrigation from the foreclosure sale was made in the decree of the federal court on condition it would be purchased by the water users. If not, it will revert to the bondholders. But as the terms for the purchase of the irrigation system are easy and the price reasonable, it will be bought by the water users.

The Atascadero Water Company, San Luis, Obsipio county, has applied for thirty cubic feet per second from the Salwas river. Its project represents a prospective expenditure of \$750,000.

The Cheney Slough Irrigation Company has asked permission to appropriate 8000 miners' inches of water from the main Sacramento river for the irrigation of about 10,000 acres in Colusa county on the old Jimmino Rancho. A large pumping system, consisting of three units, is proposed as the means for diverting the water.

The water will be delivered to a canal ten miles long and distributed by means of laterals.

### Colorado

An extensive investigation into irrigation matters will be made this year by the state of Colorado and the United States government, through the experimental department of the Colorado Agricultural college to determine the "duty" of water. The project to be carried under the federal fund available to the college will be the investigation of the Poudre river irrigation system. Director C. P. Gillette of the experiment station, and V. M. Cone, the government expert in irrigation investigations, will have charge of the work. Half a dozen men will be used in gathering facts. The purpose of this investigation work is to determine the amount of water which comes down the river, how much of it goes into the ditches, how far it goes and how many acres of land the water irrigates. Taking the ratings at various times of the day at many headgates will keep these men busy while the experiment is in progress.

### Montana

A body blow has been dealt the Sun river irrigation project in an order just received from the secretary of the interior designating 125,000 acres on the Teton slope open under the enlarged homestead act!

The designation is effective March 10, 1916, and is a reversal of the decision of the geological survey by the secretary of the interior.

The land thrown open is in the vicinity of Dutton, and is understood to mean that 400,000 acres more on the Teton slope under the Sun river irrigation project will be designated under the enlarged homestead act in the near future, which would mean a body blow to the Sun river irrigation project.

### New Mexico

S. S. Carroll, chief hydrographer of the state engineer's office, is in Luna county to inspect the wells put down by the Rio Mimbres Irrigation Company and determine what amount of land can be irrigated with the water they produce. The inspection was ordered by Judge Colin Neblett of Silver City.

### Nebraska

The Alliance land office, in a circular just issued, announces the opening for entry of 4,000 acres of irrigated lands through that office on March 24. It had previously been published that the opening would include 14,000 acres. The land, in units of from forty to 160 acres, is situated from eight to twelve miles northwest of Bayard and from six to eight miles northeast of Minatare.



### Oregon

The total cost of operating and maintaining the storage and distribution system on the Umatilla project for the season of 1915 was \$24,902.54. The area that has been relieved from charges on account of seepage is 206.5 acres. The net irrigable area subject to operation and maintenance charges is approximately 15,000 acres. This gives an average cost of about \$1.66 per acre, as compared to the cost of \$1.85 for the season of 1914.

The area of Klamath project is to be enlarged 54,000 acres within the next few months if no hitch occurs in negotiations now under way. The cities of Klamath Falls and Dorris will have this fine body of marsh lands added to their already great agricultural territory. A bond issue is to cover the cost.

Assurances have been given that the Suttles lake irrigation project of the Grandview district, in Jefferson county, will be carried to its completion by April, 1917, by a Salt Lake City concern, which has offered to take up the \$600,000 bonds. All of the preliminary surveys have been completed under the direction of George S. Young, project engineer, and as soon as the contract is let work may begin. The Suttles lake project covers 12,000 acres.

Permits for irrigating 87,329 acres of land, developing 30,766 horsepower and storing 285,669 acre-feet of water were issued last year by State Engineer Lewis. The permits number 581 and the total estimated cost of all the projects under them is \$5,349,152.

E. G. Hopson, consulting engineer, has completed plans for the proposed Five-Mile Rapids irrigation project and submitted them to the Chamber of Commerce at Pasco, Wash. If the preliminary steps now being taken are carried out a total of about \$3,000,000 will be spent to reclaim 70,000 acres. A district will probably be formed, and bonds sold to cover it.

The contract for the construction of the \$600,000 Suttles Lake irrigation project was awarded to Henry J. Kaiser Company of Vancouver, B. C. The award of bonds to finance the work will be let at an early date. The plans for the project were drawn by O. Laurgaard, a Portland engineer.

The water right in Hood river, held by the Farmers Irrigation Company for power purposes, was abandoned by vote of the stockholders, and company rights will pass to a private corporation to be organized. This was the only power site on the river owned by private interests.

The Desert Land Board on Feb. 28 stood by its recent action in recommending to the government a further extension of the state's contract with the government on the Benham Falls unit of the Central Oregon Irrigation Company project in Crook county.

According to a joint report issued by State Engineer Lewis and the reclamation service the cost of irri-

gating 122,000 acres of land embraced in what is known as the John Day project, will be \$125 per acre. The project lies along the Columbia river, west of Umatilla, and the plan proposed is to divert water from the John Day river through a 75-mile supply canal. The report recommends that the project be not immediately constructed unless funds can be had without interest.

The desert land board has ordered the Central Oregon Irrigation Company to file a report on the amount of lands on the central Oregon canal which in its judgment are subject to sale. The company has requested the board to allow the sale of approximately 3,000 acres, but State Engineer Lewis and the settlers claim that the acreage which can now be irrigated with the company's present water system, is already oversold. The board also requested the state engineer to submit a report of his views regarding the project.

### Nevada

On March 9 on the Truckee-Carson project there are to be opened 59 public land units, covering 3,076 acres, and 2,893 acres of private lands—a total of 5,969 acres. The first water payment is \$3 per acre.

### Utah

A project to irrigate 15,920 acres in Iron county was announced when George F. McGonagle of Salt Lake filed three applications at State Engineer W. D. Beer's office for water rights for irrigation purposes. One application is for 5,000 acre feet of water from Coal creek to irrigate 3,120 acres. Another is for 10,000 acre feet from Coal creek to irrigate 8,320 acres, and the third is for 2,500 acre feet from Rush Valley wash to irrigate 4,480 acres.

### South Dakota

The men interested in the Central Water Reservation project of South Dakota are asking congress for an appropriation of \$100,000 to cover cost of a survey.

The South Dakota Irrigation Association met at Pierre in February. Its object is to promote legislation that is beneficial to all irrigation projects, and it was decided at this meeting that the most important work before the association at this time was the pending amendment to the state constitution permitting the organization of State Irrigation Districts.

### Idaho

Caldwell capitalists, headed by County Attorney H. A. Griffiths, are nearing consummation of plans for reclamation of approximately 5,000 acres of land lying between Caldwell and Notus, most of which is a part of the Black Canyon district. Mr. Griffiths has just been granted a permit by the state engineer to divert 50 second feet of water from the Wilson slough drainage ditch and 25 second feet from the Mason creek drainage ditch for the purpose they have in mind.

Under the plans as proposed by the Utah Construction Company, the Big

Lost River project will now be attempted in two stages, or units. At a cost of from \$500,000 to \$750,000, the first half of the dam near Mackay, Idaho, will be constructed during the coming summer. The first unit, it is estimated by officers of the company, will be sufficient to reclaim about 30,000 acres of land. If the plan that has just been approved by the land board proves successful, the remainder of the dam will be constructed in 1918.

The codification of the irrigation and drainage laws of the state of Idaho under the direction of the irrigation and drainage commission created by the last legislature and appointed by the governor, has been issued, together with a report of the commission to the governor showing the findings of the commission on all of the irrigation projects investigated. The codification was done by A. C. Hindman as compiler and his work has met with general satisfaction. The codification covers 303 pages, with introduction and index, as well as a copy of the act creating the commission.

An equity suit was brought in the Federal District Court on Feb. 25 by a bondholders' protective committee to safeguard the affairs of the Twin Falls Oakley Land & Water Company, a Delaware corporation, engaged in irrigation projects in Idaho. The company owes more than \$2,000,000, the greater part of which is in bonds on which interest has been defaulted, but it is claimed that the company has valuable contracts and the court is asked to direct the Equitable Trust Company as successor of the Trust Company of America, trustee under the mortgage, to turn over any money in its possession so that the business of the company may be carried out. The contracts amount to some \$1,800,000 and although the company is unable at present to meet its obligations, it is claimed that it is really solvent.

A decision was rendered this week by Judge Bryan at Caldwell that is of vital interest and importance to all the owners of land under the Farmers' ditch and the Noble ditch, the two principal irrigation canals that furnish water for the famous Payette bench lands. Judge Bryan's decision in effect nullifies in toto the assessment of \$20,000 against the Farmers' ditch and \$10,000 against the Noble ditch, these assessments having been made by the officers of the drainage district organized at Falk's some time ago. The drainage district officials levied these two large assessments on the theory that these two irrigation canals were responsible to some degree for the water-logged lands comprised in the drainage district which is situated between a point east of New Plymouth and west of Emmett.

An appeal has been carried to the United States circuit court of appeals at San Francisco from the decision of Judge Frank S. Dietrich of the federal district court for Idaho in the Twin Falls-Salmon river project case, wherein Judge Dietrich restrained the representatives of the company and



bondholders from collecting any past due instalments of either principal or interest on the purchase price of water rights until they are able to show the court that two and three-quarters acre feet of water has been or will be provided for each acre of land retained in the project.

Work has just been started on the dredging of the 51.65 miles of drainage ditches authorized to be built within the Nampa-Meridian district at a total estimated cost of \$557,000. This work will be done entirely by the government, which will use four powerful electric dredges.

Representatives of the Gem irrigation district have made a strong plea to the state land board for the state to assume its share of the heavy bond issue on that project so that the burdens of the settlers and others can be lightened. There are 30,000 acres of land within the district. Of this amount the state owns between 9,000 and 10,000 acres. The land board finally decided to take the issue under advisement and to render its decision later.

Those settlers on the Boise project of the United States reclamation service who have received a patent for their lands, whether it be what is known as a "reclamation patent" or otherwise, must pay taxes on their land, according to a ruling made by Judge Dietrich in the United States court in the case of the United States against the officials of Canyon county, brought for the purpose of restraining the county from imposing taxes on lands the title to which is still vested in the government, says the Boise Statesman. Under the reclamation act of 1912, settlers who had

completed their residence, cultivation and irrigation proof, but had not fully paid up on their water rights, were given what is called "reclamation patents," which give the government a prior and paramount lien on the lands for the unpaid water rights. After hearing the argument on the defense's motion to dismiss the case, Judge Dietrich held that the lands of the holders of such patents were properly taxable.

With respect to the second group of settlers—those who have made residence proof, but have not proved up on cultivation or irrigation, the court took the question of their liability to taxation under advisement, their status being different from those who hold patents.

#### Kansas

The Garden City Irrigation Power Company is authorized to require pa-

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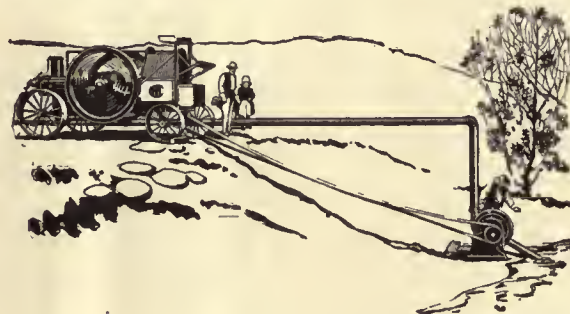
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trons living at a distance from its main power line to make contracts for three years, in an order issued yesterday by the Kansas public utilities commission. Patrons along the power line will be allowed to purchase "juice" by making a contract for one year with the company.

#### Washington

C. H. Swigart, former supervising engineer of the Reclamation Service, presented to the Washington Irrigation Institute some figures on the proposed Northern Pacific high line project. The high-line canal, as surveyed, would leave the Yakima river at Roza and extend along the south slope of the Rattlesnake Hills, above the Sunnyside Canal, carrying 2,200 second-feet. It would reclaim about 192,000 acres, now worth \$2.50 an acre for grazing alone, and would raise the value \$100 to \$200 an acre. The divisions of this land were given as follows: Moxee, 20,900 acres; Zillah, 22,500; Sunnyside, 27,200; Prosser, 34,100; Benton, 10,600; Cold Creek, 39,000; Kennewick, 38,000.

With the Yelm irrigation project two-thirds completed, the work is far enough along so that 3,000 acres will be under irrigation this summer. The water will be turned on the prairie when needed as the season advances, in June, July and August. A grand opening will be held in April when all the Tacoma clubs will be invited to see what has been done by the farmer.

By a majority of three to one the property owners under the Happy Home irrigation project voted to form a district and build an irrigation ditch from the forks of the Dungeness river to the east line of Clallam county, a distance of thirteen miles, to irrigate over 14,000 acres, much of which is worthless without water.

The estimated cost of the improvement is over \$100,000 and a contract for the construction of the ditch will be let in March. Otto Sindars, Otto Sporeen and George Gedelman were elected directors.

#### Wyoming

The Shoshone Project Water Users have asked the secretary of the interior to issue an order reducing all operation and maintenance charges for 1915 to a maximum basis of \$1.00 per acre, leaving all charges under \$1.00 unchanged. This can be done, it was shown, because during the season of 1915 operation and maintenance produced a trifle more than \$23,000, which is \$3,000 in excess of its cost to operate and maintain the system.

The directors of the Anderson-Cottonwood Irrigation District have offered for sale the first instalment of the \$480,000 district bonds voted for the construction of the system. The bonds will bear 6 per cent interest.

The El Centro Irrigation District has agreed to sell to the mutual water companies of the Imperial valley fifty miles of canals belonging to the California Development Company whose irrigation system will soon be

sold at public auction. This district intends to bid it in. This means that the thirteen mutual water companies whose future seemed doubtful will survive.

The directors of the Cheney Slough Irrigation District have awarded contracts for the construction of the main ditch from the Sacramento river to Cheney Slough, a distance of two miles and a half, laterals, drain ditches, pumps and motors. Excavation is to be finished in forty days.

Announcement is made by the U. S. Reclamation Service that measurements made on December 31 last, show there is now in storage behind the Elephant Butte dam enough water to irrigate for one year all the land in the lower Rio Grande valley now under cultivation. The measurements place the exact amount of water at 361,563 acres feet, or enough to cover that number of acres to a depth of one foot.

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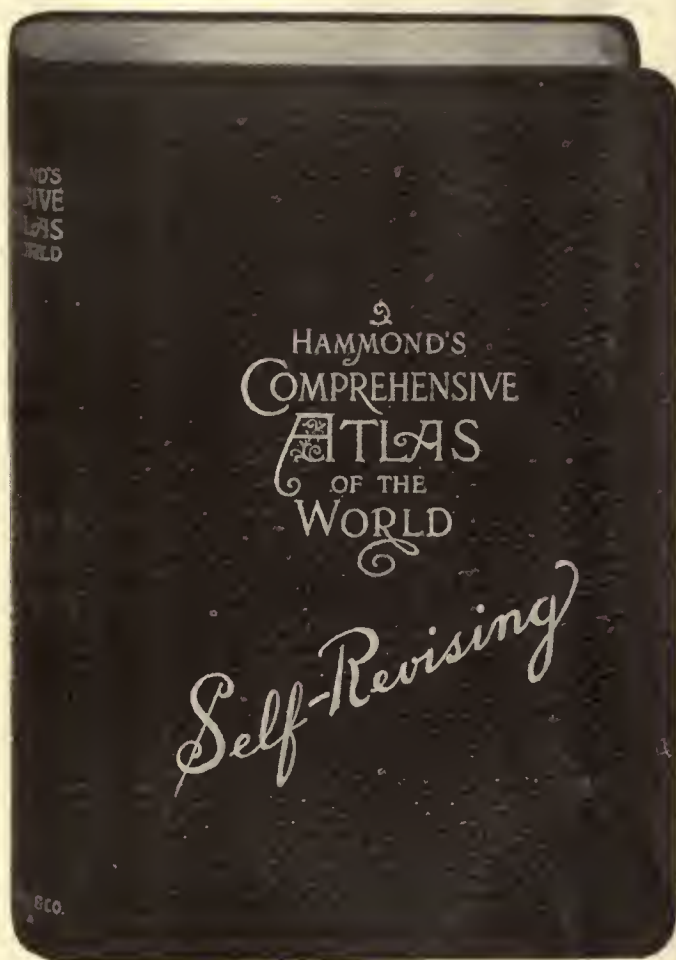
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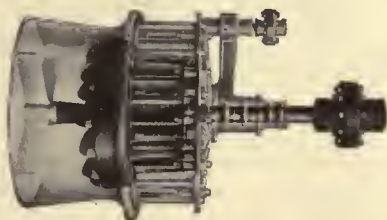
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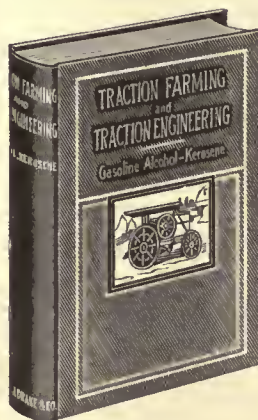
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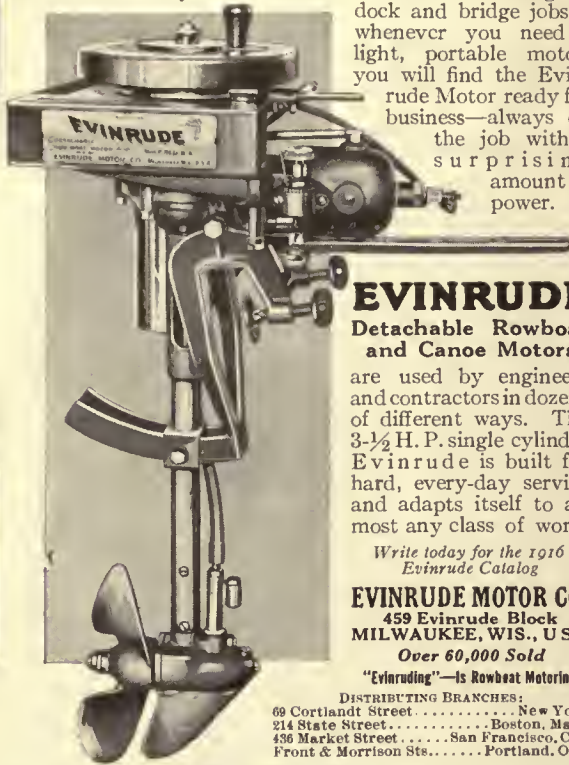
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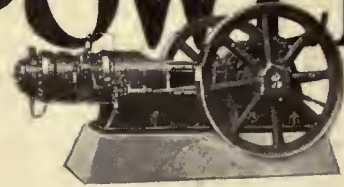
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# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, APRIL, 1916.

No. 6.

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D. H. ANDERSON, Editor

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### Forty Acre Unit Plan May Now Be Changed

At last the Government has reached the conclusion which the settler on the reclamation projects has contended for for years, that the system of dividing irrigation districts into forty-acre tracts is a mistake. Save in fruit growing districts there is no exception to the now conceded contention. And even the fruit grower, who in recent years has been compelled to contend with seepage, frosts and other calamities, has concluded that the forty-acre tract is a mistake.

A bulletin just issued by the Agricultural Department gives some of the findings from a survey in Chester county, Pennsylvania. In that region, where dairying and intensive farming are generally practiced, it has been found that the forty-acre farm is not large enough. On less than forty acres, we are told, the difficulties of success with the type of farming most prevalent in that region, namely, dairying, are so great that only one man in sixteen was able to make more than \$1,000 a year for his labor.

It was shown that the relative cost of equipment for the small farm is so high as to make the cost of operation much greater, relatively, than on larger farms of the same type. Of the idea that the small farm is the ideal of American agriculture, the authors of the bulletin embodying the report

of the survey say: "It is a distinct fallacy. Very small farms are difficult to make successful anywhere, under American conditions, and it is only the exceptional man who is equal to the task."

If it is the exceptional man who can make a fair living on a highly developed forty-acre tract in Pennsylvania, where dairying is the principal industry, how can the Government expect the ordinary homesteader on a Western irrigated farm to support a family on a forty-acre tract of wholly undeveloped sagebrush land?

### Drainage Is the Great Crying Need of the West

"Drain the water-logged lands and give the farmers on the Government projects the use of cheaper money." These are the two problems which the entire West is now endeavoring to solve.

Drainage is the great immediate crying need, and the sooner the reclamation project officials take steps for a universal application of aid, the sooner will they make sure of the future success of the undertakings.

On the Boise and Minidoka projects some excellent work has been done and the result is highly gratifying.

But on the Gunnison project in Colorado, at

Grand Junction, on the Truckee-Carson project in Nevada, and elsewhere, as well, there is need of immediate action, and it is to be hoped that the reclaimed land which is being lost will be definitely and permanently reclaimed by Government help in the matter of drainage.

**The Orland Experiment Will Be Tried Out in June** Dr. Elwood Mead had occasion to outline in detail his plan of rural credits in connection with the celebration held at Orland, California, in March. For it is on the extension lands of this project that an effort will be made to give the settler a lifting hand.

About a thousand water-users had gathered to hear the remarks of Dr. Mead, and his reception was gratifying to say the least. It remains now for Congress and Secretary Lane to give their approval, and this should be forthcoming, for there is an evident intent in Washington to make the reclamation projects successful.

In a nutshell, the plan is to give the buyer approximately thirty years to pay for two-thirds or three-fourths of his irrigated farm, and the rate of interest is to be about  $4\frac{1}{2}$  per cent, although even 6 per cent would be safe. One-third or one-quarter is to be paid in cash.

An editorial in the San Francisco Chronicle sums up the situation forcibly. Here is an extract from it well worth perusal:

"Possibly the Orland reclamation district furnishes the best example. The owners of the land are under contract with the Government to fix a price for their land which settlers can and will pay. They are exceedingly anxious to do so, for they must pay assessments whether the land is occupied or not. Some of the land is mortgaged, and between paying interest and assessments for the irrigation system, the burden of carrying the property is heavy. It is said to be excellent land. Here, then, are willing settlers. The problem is what a willing buyer can afford to pay.

"To begin with, there are things which are not land which must be paid for before there can be use of the land. The irrigation system will probably cost \$60 an acre, and leveling, on the average, \$25 an acre. Then there are buildings, animals and equipment.

"The cost of a forty-acre farm in an irrigated district, complete and ready to operate, would be about as follows:

Irrigation system .....	\$2,400
Leveling (average) .....	1,000
House .....	800
Domestic water supply.....	200
Barn and other outbuildings....	700

Team (at least) .....	300
Wagon and tools .....	600
Total.....	\$6,000

"That is \$150 an acre without the land, and includes no animals except the team. Nor does it include any fencing or seed. The question is how much, after paying for all this, one can afford to pay for the land. That must be determined by the price the buyer can get for the products of the land by the sale of annual crops. If he goes into the fruit business, there will be large additional expenditure, a delay of some years before getting any returns, and great uncertainty about the net returns when he gets them. They may be very large or very little indeed. If the settler pays \$50 an acre for the land, his farm will cost him \$200 an acre, or \$8,000.

"If he has the money, is willing to work hard, and likes his surroundings, he had better buy at that price. He will be sure of a good living and, if he is that kind of a man, of saving something each year.

"The problem is to find out how small a payment a good young farmer can make and safely run in debt for the balance. If he pays down \$2,000, he will owe \$6,000. Efforts are being made to find a way by which the buyer owing \$6,000 may pay interest and principal by paying 6 per cent, or \$360 a year, for  $31\frac{1}{2}$  years.

"That would probably be a safe bargain. With any less time or any longer payments there would be risk of default. There must be a margin of safety to take care of sickness or other misfortune."

**Oregon's Big Conference Was Not a Great Success** One of the most important, if not the most important, events of the month in irrigation development, was the great two days' meeting held at Salem, Oregon, March 9 and 10. The meeting was called for the purpose of organizing a campaign which would eventuate in the adoption of a system of state rural credits and state aid for irrigation projects. That it failed of its main purpose is to be regretted. The Portland Oregonian, in its issue of March 15, had this to say of the outcome, for its immediate result was to seriously endanger the inauguration of the greatly needed north unit of the Deschutes project:

"The failure of the conference to indorse a conservative plan for uniting all parts of the state in the work of agricultural development was not, perhaps, the worst feature. The specious arguments presented by some at the conference against the essential worth of reclamation in Oregon have pro-



vided talking material for those who oppose the formation of that particular district.

"There need be but scant consideration given to utterances of convention programmers. Irrigation has brought wealth to the Yakima Valley in Washington, to the Imperial Valley in California, to the lands under the Twin Falls works in Idaho, to numerous valleys in Utah. Wherein irrigation has fallen short of pronounced success in Oregon the reasons for it are understood. Mistakes of the experimental stage can now be avoided and are guarded against by new legislation and a broader understanding of engineering problems to be met.

"The district at least should be organized. That alone does not irrevocably pledge the settlers to the enterprise, for authorization of a bond issue is dependent upon the result of a future election. Organization is but a step, but it is a step which will denote among the settlers initiative, enterprise and confidence in their lands and their own ability to make good if given opportunity. The state is not the only source of financial assistance."

### IRRIGATION DYNAMOS RUN DISTRICT

There are few spots in the United States where the bounteous blessings provided by nature have been utilized to better advantage by the skill of modern electrical and irrigation engineering than is the case on Idaho's Minidoka project. Some seven miles above Rupert the Snake river has a natural fall, and here there has been constructed, under government auspices, the dam and other works which supplies all the project with all the water needed and in addition gives to the towns, villages, and to the individual farmers, electrical power for all purposes.

Nine-tenths of the people in Rupert, Heyburn, Burley and Paul use the current thus generated for heating, many of them for cooking, and about all the power used is that generated by the waters of the mighty Snake, that greatest asset of the northwest.

Here an engine for power purposes that is not run electrically is a curiosity. Their feed and grist mills, their printing presses, alfalfa mills, in fact every kind of energy, is the product of the big dynamos at the Miniloka dam.

### IDAHO WATER USERS' CONFERENCE

At a meeting of the directors of irrigation districts of Idaho held in March at Boise City, Idaho, at which directors were present from as far west as Weiser and as far east as Shelley, a resolution was passed indorsing the Addison T. Smith bill in congress.

The state legislature was asked to pass a law to include all state lands within the district boundaries, into the district and subject them to the same conditions as privately owned land with the district.

Resolutions were passed indorsing the Jones bill in congress.

The Ferris water power bill was discussed and finally approved.

The conference recommended that penalties on delinquent assessments on district lands be abolished and a rate of interest on delinquents be assessed not larger than 12 per cent. It was unanimously agreed that the settler fails to pay only because of limited means, and as the districts depend almost wholly on such people for development, it was declared they deserve help, rather than penalties.

A resolution was passed asking the state legislature to make it possible for districts to issue 40-year bonds.

The interior department was asked in another resolution, to permit the settler to make his \$1 an acre, yearly assessment payment into the district treasury instead of clearing or plowing, as heretofore required. It was agreed that many a feasible project languished for lack of consideration because the necessary engineering could not be done because of lack of funds.

A resolution was passed asking the legislature, to aid in amending the state constitution to enable the state to join the national government in reclamation work.

The officers of the meeting were Dow Dunning of Homedale, president, and H. F. Peterson of Shelley, secretary.

### MEASURING STREAM FLOW

One of the series of twelve reports presenting the results of measurements of flow of streams in the United States in 1913 has just been published by the United States Geological Survey.

Measurements of stream flow were begun by the Survey in 1888 in connection with special studies of water needed for irrigation, and since 1895 the bills passed by Congress appropriating money for the work of the Survey have carried an item for "gaging streams." Measurements of stream flow have been made at about 3,000 points in the United States and at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska; and in the Hawaiian Islands. In this work many private and State organizations have co-operated, either by furnishing data or by providing financial assistance in collecting the data. In July, 1913, about 1,380 gaging stations were maintained by the Survey and the co-operating organizations, and many measurements of discharge were made at other points.

The report on the Colorado river basin, which forms part 9 of the annual series entitled "Surface Water Supply of the United States," represents the results of co-operative work between the Federal Survey and the States of Arizona, Utah, and New Mexico. The records presented include descriptions of stations on the Colorado and its tributaries at which measurements were made and tables of daily gage heights and daily and monthly discharge.

The report is highly technical in character and has no interest for the general reader but will be useful to engineers and others interested in the utilization of the stream.—*Financial America*.

# HISTORY OF THE IRRIGATION DISTRICT IDEA IN THE WEST

A VALUABLE CONTRIBUTION TO THE RECORDS  
OF RECLAMATION IN THE UNITED STATES

THE IRRIGATION AGE is in receipt of Bulletin No. 2 of the Department of Engineering, State of California, which is a review of the irrigation work

ville, all in Butte county; Willows, Princeton, Ione, Morgan Hill, Merced, Maderia, Stratton and Cardiff. New projects, it may be seen, are concentrating in the Sacramento Valley district.

Undue speculation in land available for irrigation is scored by the report, which declares that the main problem before several of the districts recently organized is to obtain settlers for the lands for which water has been made available, and one of the most prevalent deterrents to rapid settlement would seem the high price asked for the land.

Of interest also is its history of the irrigation district idea. The report says:

"The irrigation district idea did not originate in California. Prior to the passage of the Wright Act Italy, France and Spain had provided for neighborhood irrigation systems to which the district plan is somewhat similar. Municipal organization had also been employed in drainage. The first irrigation district legislation in

the United States was passed by Utah in 1865. That legislation provided that county clerks, on application of a majority of landowners in areas proposed to be organized, should create districts. In those districts landowners were the electors, if land taxes were to be levied, or taxpayers, if general property taxes. A few districts were formed under that act, but nothing important was accomplished. The first California irrigation district act was passed in 1872. 'An Act to promote irrigation by the formation of irrigation districts.' It provided that owners of lands desiring to irrigate or drain them might peti-



Raising Canal Banks on a New California Project.

done in that state between the years 1887 and 1915.

In the past 15 years there have been formed in California, under the Wright Irrigation Act, which was recently rewritten to meet changed conditions, 62 irrigation districts, with an area of close upon 3,000,000 acres.

Although definite data as to cost has not been available in all instances, it is estimated that the total cost of watering this great area of agricultural land, changing it from barren waste to the richest land in the world, has been close to \$20,000,000. Definite figures on 3,132,489 acres under irrigation show the cost for that acreage, when completely under irrigation, will be \$12,142,011.

Since the report was prepared and placed in the hands of the state printer for publication, the Carmichael district, 1,306.52 acres; West Side, near Tracy, 11,500 acres; Terra Bella, 12,500 acres; Lindsay-Strathmore, east of Lindsay, approximately 18,000 acres; and South Lassen, near Doyle, with 22,000 acres, have been organized.

The report also brings out the point that the state is in the very middle of one of the greatest irrigation booms in the history of the country, indicated by the fact that along with the newly-formed districts and those under formation there are still a number of other districts contemplating immediate formation. They are: Paradise, Thermalito, Oro-



Excavating for a Ditch on a New Montana Project.



tion the county supervisors for the formation of irrigation districts. It was required, in the case of any proposed district, that the petition should contain a description of the land, the names of the landowners, and the names of three persons whom it was desired should serve as trustees for the first three months. After verification and publication of the petition the supervisors were required to grant it. By-laws, powers of trustees, reports, and assessments were briefly provided for. The law was inoperative. In 1874 an act was passed, applicable only in Los Angeles county, providing for the office of county superintendent of irrigation, whose duty it should become, upon petition of a majority of the property owners in any given area, to examine the plans and the feasibility of any irrigation system proposed therefor, and thereupon to notify the county supervisors, who should then call an election upon the question of taxation for the construction of irrigation works, and the election of water commissioners, only taxpayers being permitted to vote in any such election. There was no organization under that act. In 1876 another special act was passed creating the Westside irrigation district. That law provided for five commissioners, an assessor, a collector, and a treasurer. It further provided for issuing twenty-year 8 per cent bonds to the amount of \$4,000,000, to be redeemed by direct tax levy, and to be a lien upon the lands within the district. This also soon lapsed.

"In 1886, however, Mr. C. C. Wright, a lawyer of Modesto, who for some years had been carefully studying irrigation, and who was familiar with progress in Europe and elsewhere, and who, also represented a typical San Joaquin Valley community striving to obtain an irrigation water supply and to construct a community irrigation system

in spite of opposing large landowners, was sent to the legislature expressly, it has been said, to procure the passage of a law under which such communities as his own could build and operate their irrigation works. For ten years progressive farmers in Stanislaus county had been advocating the construction of an irrigation system to permit of substituting irrigation farming for the grain farming that had already begun to be unprofitable. They



Preparing the Land in the Spring for Irrigation.

had not, however, been able to agree on any plan. The only hope seemed to lie in a law under which the opposing minority could be forced into compliance with the will of the majority, and to pay their just proportion of the cost. The decision in *Lux vs. Haggin* had just been rendered and advocates of irrigation by appropriation were ready to join enthusiastically in any measure that promised relief.

"The irrigation district act passed the legislature of 1887, known as the 'Wright Act,' remained on the statute books for ten years, with important amendments, drafted in the light of experience, adopted in 1889, 1891, 1893, and 1895. In 1897 it was re-written, considerably enlarged, and re-enacted as an entirely new act, variously known as the 'Bridgford Act,' the 'Irrigation Act of 1897,' and the 'California Irrigation District Act.' Many further amendments have been made from time to time, and numerous supplemental acts have been passed, as well as a number of acts relating individually to the various districts that have been organized. The more important of the recent amendments and supplemental acts have had to do with financial aspects and state control.

"Entirely aside from any value that may be attached, from an academic standpoint, to a rather full statement



In the Sierra Nevadas, the Source of a Never-Failing Supply of Water.



of an important movement in the economic development of the State, the value of a study of California irrigation districts is believed to be two-fold. The disastrous mistakes made under the original California irrigation district act brought a tremendous economic loss to California, and a knowledge of those mistakes is the most effective preventive of a repetition of them. Secondly, irrigation districts are, as a rule, organized by people unused to effective business management, and the large general interest the State has in fostering right development warrants furnishing to those who are operating, or who contemplate organizing irrigation districts, whatever assistance available means will permit."



The Result of Irrigation—A May Scene in Colorado—Apple Blossoms and Alfalfa.

## "DRAINAGE" PUT UP TO UNCLE SAM'S RECLAMATION OFFICIALS

### From the Gunnison District

Montrose (Colo.) *Enterprise*:—When E. L. Osborn was asked what are the chief necessities of those engaged in farming in this valley, he replied:

"The two greatest necessities are that the water-logged lands of the valley should be drained and that the farmers of the valley should get the use of cheaper money."

"Well, what can be done to get those two things?"

"In my opinion the questions should be constantly agitated. Many thousands of acres are already made useful by seep and the only economical way of draining the lands is by a comprehensive plan that will make it certain that no work will be wasted and no material lost. Individual tracts cannot be effectually and economically drained.

"The reclamation service is ready to consider the question of running the main canals so that when individuals or small companies of land owners want to lay tile to drain their lands they will have a place in which to dispose of the water. I believe the reclamation service ought to be asked to make a general survey and prepare maps and specifications showing in detail just what would be necessary to be done by the service and what could profitably be done by individuals and by small companies of individuals, and give the estimated costs, and then the water users should vote on the question of whether the lands shall be allowed to go to seep or whether they want the valley drained.

"It is my opinion that if the matter were put up to the owners of land they would vote for the drainage, particularly if the payment for the draining is not to begin till after the other project costs have been paid off.

### A Drainage Meeting in Nevada

Fallon (Nev.) *Eagle*:—A meeting of the Truckee-Carson Water Users Association was held in Fallon early in March to discuss the drainage situation with Senior Engineer D. W. Cole, and Project Manager F. G. Hough.

Mr. Cole gave a very interesting account of the drainage situation on other projects in his district and of the work that is being carried on for drainage of the Boise and Minidoka projects.

Both of these projects have had drainage difficulties similar to those on the Truckee-Carson project, and the plan adopted and carried through are similar in many respects, to the tentative plan proposed for this project and submitted to an informal vote in May, 1915.

The work consists of the construction of open drains a mile or more apart. Wherever possible these drains are located in natural creek beds, similar to the South Fork which the local project plan contemplated utilizing to the fullest extent.

The main drains were dug first, and later, when their effect could be fairly well determined, spur drains were constructed as needed.

The Minidoka drains have been completed, and have been very successful in unwatering seeped and alkaline areas. In one instance a full crop of oats was raised on a tract that only a year before was in tules.

The estimated cost per acre on these two projects ranged from \$11 to \$14 per acre, and these sums were voted by the water users to be added to their construction charges and repaid under the 20-year plan on the Minidoka project, and in 10 years on the Boise project. However, in building these drains a considerable saving was made under the estimates, and the water users have authorized the expenditure of a part of these savings for drains.



## FLATHEAD PROJECT SHOULD GET IMMEDIATE AND ADEQUATE SUPPORT

Out at Polson, Montana, which is the center of the Flathead Irrigation project, the enterprising citizens of that entire section have begun an agitation for an adequate appropriation.

These men, who have everything at stake, are asking for no huge sum, merely an appropriation which will to an extent consummate the plans already approved by Congress and the Reclamation Department.

The cost of the project was to be about six and one-half million dollars. About one and a half million dollars have been appropriated for it. The government invited settlers to come on the reservation and buy its lands, with the understanding that water would be put thereon. The government divided the land to be homesteaded into irrigated units of from forty to eighty acres, thus impliedly assuring settlers who purchased the lands that their units would be irrigated by the government. Forty acres is too small a farm for non-irrigated farming; so of eighty acres. It takes at least three hundred and twenty acres to successfully carry on dry farming. Having cut these units into forty and eighty-acre tracts and authorized this project, the government assured the settlers that it would put water on their land and they went on the land with that understanding.

The settlers were justified in assuming that work on the project would be prosecuted with due diligence and completed within a reasonable time, but it was, and is, the duty of the Government to hasten the completion of the project with all possible speed and put water on the lands of both Indians and white settlers as soon as possible. Nothing is to be gained by doing otherwise. There is no reason, there can be no argument, why it should be otherwise.

It will require about five millions of dollars to complete the project, and the only sensible way for the Government to do, the only business-like way, would be to appropriate an average of a million dollars a year and complete the project in five years. It will cost just so much money, and it is nothing to the Government whether it appropriates this money in five or fifty years.

Largely through the efforts of Senator Henry L. Meyers, who has labored unstintingly for the district, and of James Harbert, chairman of the Committee on Irrigation of the Polson Chamber of Commerce, an appropriation of \$750,000 has been recommended. THE IRRIGATION AGE, speaking for the men who are depending upon Government promises, hopes that the sum will finally be appropriated.

### IRRIGATION BONDS ABOVE PAR

An indication of the prosperity of the financial market of Los Angeles was given before the Board of Supervisors on Feb. 8, when representatives of various large financial interests instituted a lively contest for the \$2,640,000 San Fernando Valley 6 per cent irrigation bonds. The first third of \$868,000 was finally awarded to the Torrance-Marshall Company, which paid a premium of \$24,315 over par, as contrasted to the offer several weeks ago made by M. S. Hellman of the Security Trust and Savings Bank, and J. C. Drake of the Los Angeles Trust and Savings Bank, who wanted the entire issue of the bonds at par and a premium of only \$3,000.—Los Angeles Examiner.

The bond issue of the Anderson-Cottonwood irrigation district brought on Feb. 5 the highest price ever paid in California for an issue of this kind. The bonds were sold to Edward N. Nearson, Jr., of San Francisco, for 95.63, realizing \$28,800 more for the district than the highest estimate of bankers and officials.

The contract for the purchase of the bonds was signed with a single condition in favor of the district, that it need not sell the entire bond issue of \$480,000 at 6 per cent interest, but may dispose of only \$400,000. In view of the fact that the issue brought \$28,800 more than expected this course may be followed.

There were five other bids. The Capital Na-

tional Bank of Sacramento, 93.77; E. J. Knight of Los Angeles, 93.77½ for \$400,000 of issue; Spokane and Eastern Trust Company with Clarkson-Earls Trust Company, varying offers, averaging about 90; George E. Catts of Stockton, 90; J. R. Mason of San Francisco, 92.65 for \$150,000 of issue.—Sacramento, Cal., Record-News.

### NAMES NEW CHIEF OF CONSTRUCTION

Secretary Lane has appointed Frank Elwin Weymouth chief of construction of the Reclamation Service, with headquarters at Denver, Colo. Mr. Weymouth succeeds Mr. Sydney B. Williamson, who resigned to accept a position in Chile with the American Smelting and Refining Co.

Mr. Weymouth was born June 2, 1874; graduated from the University of Maine with the degree of B. C. E. in 1896, and that of C. E. in 1899; was employed on municipal engineering work in New England and Canada; with the Isthmian Canal Commission on surveys and estimates for a proposed oceanic canal through Nicaragua; on railroad construction in Ecuador; and from 1902 to the present time has been in the Reclamation Service.

Mr. Weymouth has had a wide experience in both construction and operation work, and has many achievements in the field of engineering to his credit, the most notable being the construction of the Arrowrock Dam in Idaho—the highest dam in the world—which was built under his direct supervision.

## SALEM CONFERENCE ON IRRIGATION, CREDITS, DRAINAGE

A conference on irrigation, drainage and rural credits was held at Salem, March 9 and 10. Every session was a lively one, and the results were not altogether expected, although they might have been foreseen.

In brief, the conference was called for the purpose of considering state rural credits, state aid for irrigation and drainage projects and to try and harmonize them. It was not successful in harmonizing by any means, although some good always results indirectly from men meeting and telling each other what they think.

Governor Withycombe, in an address before the conference, suggested the use of the state school funds for a rural credit system. He said that Oregon today had a serviceable rural credit plan in operation—one highly satisfactory to all parties. The state has more than \$6,000,000 in gilt-edge mortgages now, and the governor suggested the possibility of using these mortgages as a basis for securing more credit. New loans could be issued of the face value of the present ones, using the old ones as collateral. With a state guarantee it would mean \$6,000,000 more available for rural credits. He promised support for a conservative, workable and safe system of rural credits.

He stated that he would oppose a large bond issue for irrigation and drainage projects, while recognizing the importance of both. He confessed doubt as to the advisability of direct state aid to irrigation and drainage plans.

Senator W. Lair Thompson of Lake county and State Treasurer Kay clashed early in the conference. Mr. Thompson criticized published statements of Mr. Kay, maintaining that his plan would be one which would protect the state and still give property owners a chance to develop. He believed a plan could be prepared whereby assistance for irrigation could be secured only after the settlers declared their wish for it and were willing to put up their homes as security for their share of the cost. Such a plan, he believed, would cut out the promoter, safeguard the state and permit the settlers to prosper.

Mr. Kay declared that there was no demand for reclaimed land and that the state should spend no more money in further projects, citing the Tumalo and other projects where demand has been very small.

Senator Thompson retorted that these were public projects, organized before there were any settlers. He wanted help only for actual settlers.

W. M. Colvig, representing the Southern Pacific, spoke against state aid for irrigation and drainage projects.

It was finally decided, after a prolonged discussion, to have two committees, each with a membership of three, to take the necessary steps and perfect the necessary organization to secure the placing of the irrigation and drainage amendment and

the rural credits amendment to the state constitution by the ballot and to work for their passage. It is provided that the committees shall work with the attorney general and so far as possible, with each other.

### DRAINAGE IS A "SPECIAL" BENEFIT

The Supreme Court of Nebraska has just rendered an important decision affecting the rights of water-users.

Plaintiff in this case was the owner of about 300 acres within the limits of the drainage district. In the construction of a drainage ditch it became necessary to run the main channel and a lateral ditch through his land. The required land was condemned and plaintiff was awarded \$1,151.96. Plaintiff appealed.

The principal points involved were with respect to the right to recover for consequential damages to that part of plaintiff's land which was not taken for the ditch, and as to the difference between "special" and "general" benefits. Plaintiff contended that the incidental benefits accruing to his land from the presence of the drainage ditch were "general" benefits, and could not be set off against and held to cancel the actual damage done to his land.

The court held that the benefits received by plaintiff from the ditch draining the land of surplus water, preventing overflows, and permitting crops to grow where it was impracticable before, were "special" benefits, even though they were also enjoyed by other landowners along the line of the ditch. "General" benefits were said to be increased healthfulness and salubrity of the surroundings, ability to use the public roads at a time when if undrained they would be impassable, the removal of swamps or low and wet places, fit breeding ground for malaria, etc., and in the general desirability of the vicinity as an abiding place. Such "general" benefits, of course, would not be subject to set off.

However, as stated, the court held that the benefits accruing to plaintiff's lands were of a more "special" character and could be set off against consequential damages, the court holding that—

Where the land has been benefited by the construction of the ditch to an amount in excess of its assessment for the cost of construction, these excess benefits may be set off against consequential damages, and since the market value of his land was increased by the enterprise more than the consequential damages sustained plaintiff suffered no pecuniary loss for which damages can be recovered.

**SEND \$1.00 FOR THE IRRIGATION AGE  
ONE YEAR AND THE PRIMER OF  
IRRIGATION.**



## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### California

The committee appointed by the board of directors of the South San Joaquin Irrigation District to secure rights of way for drainage canals has completed its work and has made a formal report to the directors at the district offices in Manteca.

The state reclamation board at a recent meeting ordered a new assessment levied for the Sacramento bypass, amounting to \$1,095,000. The board at the same meeting cancelled the previous assessment for the bypass, and the appointment of the three assessors to levy that assessment. Three new assessors were named to apportion the levy, B. A. Etcheverry, professor of irrigation at the University of California; Max W. Enderlein, a former member of the state board of equalization, and G. C. Hermann.

The Madera irrigation bureau has decided to organize an irrigation district under the act of 1913, as a protest against the recent action of the Panoche company, which recently filed with the state commission its application for water from the rivers from which the proposed Madera district is to receive its water for irrigation purposes.

At a meeting at Princeton, Colusa county, the organization of the first unit of settlers on the Sacramento Valley Irrigation project for the purpose of taking over in units the canal system of the Sacramento Valley West Side Canal Company, was effected. The unit will be known as the Princeton-Codora-Glenn Water Users' Association, a mutual company. The area comprising the district will be between 16,000 and 20,000 acres. The distribution system within this territory will be taken over at a price of approximately \$160,000, at a cost to the settlers of approximately \$8 per acre. The district concerned is known as the Sacramento River section. Payments for the canal system will extend over a long period.

The proposal to organize an irrigation district under the Wright law to take over the Woodbridge canal system is meeting with determined opposition on the part of some of the large land owners in the proposed district.

The water system which operates from the Big ditch and which supplies El Dorado county farmers with water for irrigation and also conveys water through the Big ditch to Placerville for domestic purposes, is still in dispute, with two companies alleging ownership. The Placerville Gold Mining Company contends ownership by virtue of a sheriff's deed delivered on February 23, and is going about in improving the system. E. R. Hough, trustee, is on the opposition side. Through his agent, Ray

C. Beal, he asserts possession of the properties and alleges that he is operating the system for the benefit of the bondholders of the Sierra Water Supply Company, under a trust deed against which no foreclosure has been made. Hough also has a force of men at maintenance work on the system.

An agreement by which 12,500 acres of fine land southeast of Oakdale will be irrigated is very near consummation between the newly-formed Waterford Irrigation district and the old Modesto Irrigation district. At a meeting recently the Waterford district offered to pay the Modesto district \$254,000 for the right to use the main canals of the older district to bring water to the lands. The land is of the richest in the state, adjoining the best sections of both Modesto and Oakdale regions, and it is believed that a final settlement will follow soon and work on the new irrigation system begun. The matter must, of course, be submitted to the electors of the two districts for a final decision.

The state water commission has granted the petition of Celso Tonello for permission to take water from the Stanislaus river by means of a pumping plant, overruling the protests of the Oakdale irrigation district against this grant. The commission has, however, refused to allow Tonello's claim to five cubic inches of water, and limits his grant to sufficient water to irrigate seventy acres. The ruling is important, in that the commission decides that as long as any farmer wishes to put water to beneficial use, he may do so, provided it does not interfere with vested or other rights in the Stanislaus river.

In the election held in Cardiff March 10 there was an almost unanimous vote in favor of establishing an irrigation district there. W. E. Kinder was attorney for the district. An election to vote bonds in the sum of about \$100,000 to meet the expense of an irrigation plant will be held in about sixty days.

The supervisors at Los Angeles early in March awarded \$1,736,100 bonds, all that remains out of the \$2,600,000 issue for the San Fernando irrigation district, to Perrin, Drake & Riley, the E. J. Knight Company and the Aronson-Gale Company, who placed a joint bid on them. The bid was par with accrued interest on the bonds for six and twelve months and a premium of \$50,000. Delivery of the bonds is to be made, part at the end of six months and remainder at the end of twelve months. Originally this combination offered only \$34,800 premium, but raised it to \$50,000 later.

All necessary legal formalities have been completed for calling an election for the purpose of issuing \$1,250,000

in bonds for the construction of the Terra Bella Irrigation district, for the reclamation of 15,000 acres of fine citrus land.

At the recent congress of the Inland Waterways Association the Sacramento River flood control project, as planned by the state engineer, was endorsed, also the plan for control of the San Gabriel River by turning its waters into Alamitos Bay.

### Oregon

Unless the Vale-Oregon Irrigation Company of Vale puts a larger force at work and makes it certain that its dam can be safeguarded before the floods come on Billy creek, State Engineer Lewis will warn settlers to leave the valley below the dam, it was announced. Engineer Stricklin, who was sent to examine the dam, found that it was merely a concrete wall and was wholly inadequate to hold back heavy flood waters. He fully sustained the contentions of the settlers as to the danger of disaster in case of flood.

Sand Hollow land owners are sufficiently interested in the proposed Sand Hollow Irrigation project to put up money toward the cost of engineering and preliminary work. This is the report brought by Project Manager J. G. Camp of the reclamation service.

The people of the Malheur Valley are signing up petitions asking the county court to establish a district that will cover all the lower lands that can be irrigated from a reservoir at the Warm Springs site on the Malheur and, if acted on favorably it will make feasible and practical the bonding of about 30,000 acres of fine land for irrigation. This will include several thousand acres of land already under a partial water right, but gives water to a great deal of new land, at a minimum cost.

### Utah

Experiments with irrigating wells in dry farm territory will be increased this spring by the Utah state conservation commission. This was decided by the commission at a recent meeting. These experiments will take place at Nada and Malone, on the Salt Lake Route, and in extending them the commission acted upon the recommendations of T. L. Allen, assistant secretary of the commission, and L. M. Winsor of the agricultural college. These two recently visited the wells. Last year forty acres of land at each place were cultivated with water pumped from the wells, under the immediate supervision of Mr. Winsor. The cultivation was an entire success, it was stated, and now the plan is to enlarge the area to eighty acres in each place. The commission believes that the well may successfully water 160 acres.



### Wyoming

Counsel for the settlers on lands which the Wyoming Central Irrigation Company contracted to reclaim, but which it did not reclaim, have advised the rejection of a proposal from holders of \$146,000 of the bonds of the Wyoming Central to transfer those bonds to the settlers for \$48,666.66, which is one-third of their par value. Counsel for the settlers advise that if the settlers acquired the bonds they would be merely acquiring questionable claims against themselves.

### Texas

The San Antonio Land & Irrigation Company and Frederick R. Swift, as trustee in bankruptcy of the company, have appealed to the United States circuit court of appeals from the decision of Judge A. N. Hand, of the district court, who recently declared that the adjudication of the company as a bankrupt was void because its principal place of business was in Texas.

The receivership of the San Benito Land and Water Company, involving about \$1,000,000, will soon be terminated. Judge Waller T. Burns of the United States court has just authorized the issuance of \$79,000 receivers' certificates to take up a maturing issue of the same amount. The authority was granted upon application from Edward D. Rowson, receiver. The petition of the receiver explained the arrangements pending to wind up the receivership. It is understood that there will be no objection to the bondholders' petition filed last September, asking foreclosure. Foreclosure of \$350,000 bonds out of original issue of \$1,050,000 is understood to be the method agreed upon. Should this occur, the St. Louis Trust Company and Thomas N. Dysart, trustees, will obtain possession of the big irrigating system of the company around San Benito. The property includes thirty-seven miles of canals and 100 miles of laterals. There are 52,000 acres involved in the irrigation enterprise, besides 16,000 acres of the company. Petitions are now being circulated in the San Benito territory asking for the establishment of an irrigation district. If such a district should be formed, bonds could be issued to pay for drainage and irrigation. The plant of the company could be purchased and a movement to that end is on foot.

### Colorado

The survey of the big ditch for the Moffat Irrigation district, from the point of diversion in the Rio Grande river to the foot hills north and east of this place, is complete, being 51 miles in length. The ditch has been mapped out with a fall of 3 feet to the mile, which is considered to be a good slope for a canal of that size. The ditch survey work has been done under the direction of John E. Fields, a member of the state land board.

### Idaho

Because of illness or absence from the state of leading attorneys in this case, Judge Bryan announced that conclusion on the Farmers' Co-operative Ditch company vs. Riverside Ir-

rigation district suit will not be reached until April or May.

The state land board has passed a resolution incorporating a tentative proposal for the reduction of the Twin Falls-Oakley Carey act project to approximately twenty-one thousand acres, a reduction of about ten thousand acres from the original size. The resolution provides that the entrymen under these canals shall be paid by the Twin Falls-Oakley Land & Water company for such improvements as they have made, and that these settlers shall have the right to make selections of lands in those portions of the segregation as shall be unoccupied, acre for acre, for their holdings in the abandoned portion of the tract.

Purchase by the United States of the King Hill irrigation system in this state and its completion by the reclamation service, is the object of a bill introduced in the present congress by Congressman Robert M. McCracken of Idaho, who seeks to have this Carey act enterprise purchased at public auction by the state and placed under federal jurisdiction. The act is now in the hands of the committee on irrigation and arid lands. Congressman McCracken is a member of that committee, a fact favorable to the measure. One investigation of the project has already been made. It is probable the committee in possession of the bill will authorize a further investigation of the project by the reclamation department.

While it will be impossible to engage in actual construction work for several weeks, the Utah Construction company engineers are engaged in office preparatory work on the Big Lost River irrigation project in Idaho, according to the announcement of W. H. Wattis, president of the company. After a year of negotiation the local company's contract for completing this immense project was approved by the Idaho land board a few days ago.

Field notes on the project were taken by the company's engineers in a complete survey of the project about one year ago, according to Mr. Wattis. These field notes are now being worked up in the local offices of the company. By the time the first detailed plans are drawn Mr. Wattis believes the snow will have sufficiently disappeared to permit of actual construction work.

As outlined at present, the main impounding dam will be located four miles north of Mackay, Idaho, but there will also be several smaller diverting dams. The company will use the unit plan in completing the project; the first unit to be used a season to test the amount of water available before additional work is taken up. It is estimated that the first unit of the main dam and distributing system will reclaim about 30,000 acres of land.

Black canyon settlers of the vicinity of Notus are actively at work in support of proposals for extending the government project on the north side.

New life to the West End Twin

Falls Irrigation company's project seems assured in the action taken by the company before the state land board when their bond for \$45,000 was renewed. It is pointed out that the renewal of the bond presages immediate work on the project, in that the bond will be forfeited should work not be begun by July 1.

Work on the Wickahoney, or old Bruneau irrigation project, is to start as quickly as the weather will permit this spring. This was the assurance given Governor Alexander by David Miller, of Kansas City, who will make Boise his headquarters while the work is in progress. Mr. Miller is president of the Wickahoney Land & Water company. He announces a survey of the proposed ditch has been made after expending \$10,000 for preliminaries. A total of close to \$1,000,000 will be spent putting the irrigation works in for this project.

### Washington

With little blowing of horns an irrigation system for Yelm prairie has been constructed and it is reported that it will be ready to turn water on the land in May for this year's crops. The operation of this system will be closely studied by residents of cities as well as residents of the country.

Forty users of water rights for the irrigation of their lands in Walla Walla county have filed a complaint with the public service commission against the Attalia Land company, charging that the company contemplates abandoning its gravity system which has supplied them, and ask for a hearing and relief.

Lewis A. Thompson, a land owner in the Grant county tract to be brought under the proposed Quincy irrigation project, has secured signatures of Spokane land owners representing 27,760 acres asking congressmen from Washington to back Senator Miles Poindexter's plan for the opening of Priest and Rock Island rapids, as a preliminary in getting water upon the tracts. Mr. Thompson expects to tour the entire district and secure the signatures of resident land owners to the petition. An expenditure of approximately \$7,000,000 will be required under the present plan, in contrast with the maximum \$40,000,000 expenditure proposed in the bond issue plan which was defeated by referendum two years ago.

Definite steps were taken at a meeting of the farmers of Aeneas and Bonaparte valleys toward the formation of an irrigation district under state laws. The district proposed will irrigate 5,000 acres along Aeneas and Bonaparte creeks and on the upper bench east of Tonasket, the canal lines running several hundred feet higher than those of the West Okanogan valley irrigation district, which also waters land in the immediate vicinity.

Marvin Chase, who for the past two years has been engaged in promoting the Whitestone Irrigation & Power company, expects to have the



first unit of this project, about 4,000 acres, under water by the last of June this year. Already approximately \$90,000 have been spent on the project and it will take another \$75,000, to complete the first unit. This is all eastern money which Mr. Chase has interested in this project.

Eventually there will be some 13,000 acres under water. The land lies on the west side of the Okanogan river about midway between Oroville and Riverside.

### Montana

Rocky Reef Ditch company is the name of a new corporation just formed in Cascade county to engage in the irrigation business. It states that water for this proposed system is to be taken from a point on the left bank of Sun river.

The land under irrigation water on the Flathead reservation will be doubled this year, if the plans of the government are carried out. There are 40,000 acres of land under irrigation now, and that will be increased to 75,000 or 80,000 acres by the end of this season, according to all expectations.

### Nebraska

The opposition of the reclamation service in Washington, D. C., to the new tri-county irrigation project, embracing Phelps, Gasper and Kearney counties, is explained in a letter from Senator G. W. Norris to Secretary Whitten of the Lincoln Commercial club. Besides the present congress is too busy to give it consideration.

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Of The Irrigation Age, published monthly at Chicago, Ill., for April 1st, 1916.  
State of Illinois, County of Cook.

Before me, a notary public, in and for the State and county aforesaid, personally appeared D. H. Anderson, who, having been duly sworn according to law, deposes and says that he is the publisher of The Irrigation Age and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—D. H. Anderson, 30 No. Dearborn St.

Editor—D. H. Anderson, 30 No. Dearborn St.

Managing Editor—Alfred Patek, 30 No. Dearborn St.

Business Manager—I. E. Stanley, 30 No. Dearborn St.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

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3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

D. H. ANDERSON,  
Editor, Publisher.

Sworn to and subscribed before me this 4th day of April, 1916.

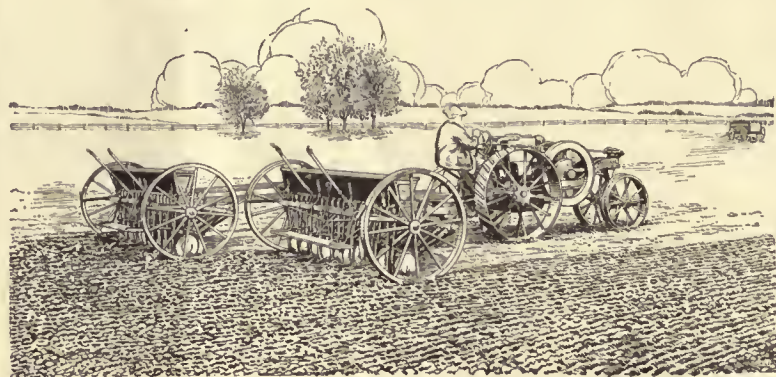
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the senator thinks. "It is claimed," he writes, "by the officials, that it would be necessary, in order to get the water into the ground, to make a complete system of ditches, to the same extent that would be necessary in any irrigation project. If this expense had to be paid by the ones who owned the land, it would at once bring up the difficulty that would be hard to overcome. In order to make it a practical proposition, all of the farmers who would be benefited by it would have to pay in proportion to their acreage. This is the plan of the reclamation service. I do not believe this plan would work, and if we would carry it out it will have to be modified in order to lessen the expenses, because it would require the consent of all the people in order to make it at all feasible."

#### Kansas

The Arkansas Valley Irrigation company ditch has been sold to H. E. Lindas of Great Bend, president of the Arkansas Valley Telephone company, according to the Dodge City Globe. It is understood the purchase price is \$150,000. It is not known in Dodge City what Dr. Lindas' plans for the ditch are, beyond the fact that he plans to start this spring to make improvements that will put it in condition to supply all the water needed for irrigation purposes. The ditch is the third project of A. T. Soule, the Rochester promoter, which has been revived in Dodge City in the last few years. It was in 1883-1886 that Soule dreamed of the future part Dodge City was to play in the southwest, and started the enterprises which were to struggle for thirty years before being brought to full development.

#### Nevada

There are now open for entry in the Truckee-Carson project, including the lands opened by the public notice of February 11, 1916, about 115 farm units comprising a total of approximately 6,000 acres of irrigable land. These lands are all scattered among the irrigated farms and are adjacent to constructed canals from which a water supply may be had during the season of 1916. Many of these units are very desirable locations as may be readily determined from the character of the cultivated farms which adjoin them.

The annual Indian appropriation bill has been reported by the senate committee with \$3,000,000 added to the total of \$9,000,000 carried by the measure as it passed the house. Increases include \$900,000 for irrigation projects on Montana Indian lands, \$275,000 for common schools in Oklahoma Indian districts, and \$175,000 for an irrigation project on the Gila river near Florence, Ariz.

The secretary of the interior, Franklin K. Lane, has officially announced the opening of lands in the Carson-Truckee project, which comprises 55 public land farm units of an acreage of 2,842 and 2,897 acres of privately owned lands, which are made subject to water rights regulation.

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Wheel base—104"	Length over all—161"
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Pulley—550 R. P. M.	Diam.—14", Face—8"
Front wheel—diameter—32"	Face—6"
Drive wheel—diameter—64"	Face—12"
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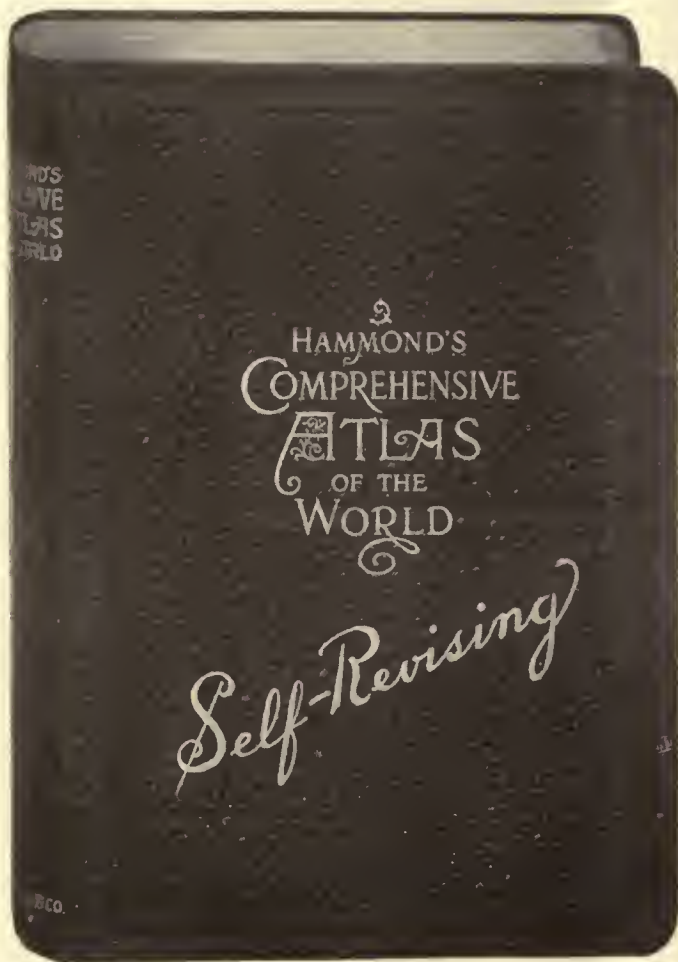
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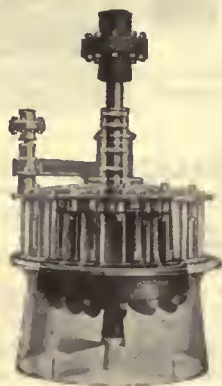
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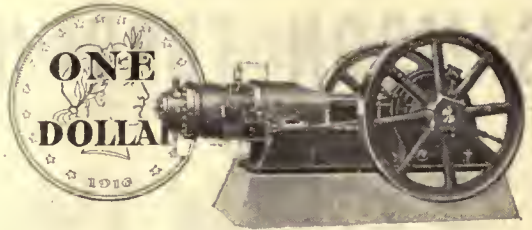
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Thirty-First Year

# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, MAY, 1916.

No. 7

## THE IRRIGATION AGE

With which is Merged

The National Land and Irrigation Journal

MODERN IRRIGATION

THE IRRIGATION ERA

ARIO AMERICA

THE WATER USERS' BULLETIN

THE DRAINAGE JOURNAL

MIO-WEST

THE FARM HERALD

THE IRRIGATOR

D. H. ANDERSON

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### California Will Have an Irrigation Day: May 13

the first year for the event and the date is May 13. Governor Hiram Johnson is to be the principal speaker.

The central idea of "Irrigation Day" is to arouse the people of the two affected counties to a consciousness of their opportunities in irrigation. Examples of irrigation will be inspected and publicly discussed by able speakers, including, besides the governor, Dr. Elwood Mead and Colonel Harris Weinstock.

It is planned to inspect many irrigated farms and orchards over the two counties.

### The Need of Water Users' Associations in the West

In a circular addressed to the water users on the Truckee-Carson project, the government manager, Mr. F. G. Hough, makes an appeal for organization that has the right ring to it. For organization means harmony, a merging of the interests of the one in the interests of the many. In a personal letter from Mr. Hough we learn that the circular is already bearing fruit.

"In your April issue," he says, "I note several references to the need of drainage on the Truckee-Carson project. This matter is receiving a great deal of attention and the water users are taking steps to perfect an organization for carrying on this work under a proposed contract with the Reclamation Service under the terms of the Reclamation Extension act. The water users have requested assistance from the Reclamation Service in effecting their organization and they have been advised by Chief Counsel Will R. King that a legal advisor will be sent to the project for this purpose."

### Irrigation Men Hold Big Meeting in Washington

sults of the meeting.

Delegations were present from all of the western irrigation states, as well as from most of the drainage states of the south.

Resolutions were passed urging Congress to give favorable consideration to the Jones bill and the Smith bill, both of which now are pending. The Jones bill would enable the federal government to guarantee the interest payments on approved irrigation or drainage projects. It would be materially

The western delegates who attended the April Irrigation and Drainage Conference in Washington have returned to their homes thoroughly satisfied with the re-

beneficial to the western states, it is argued, and by stabilizing the market for irrigation and drainage securities. The measures provide in a federal way what the legislation proposed by recent state credits conferences proposed in a state way.

The Smith bill is closely related to the Jones bill. It would make government lands capable of reclamation within any improvement district subject to lien, the same as privately owned lands. One drawback now is that government land is exempt from liens, thus retarding many needed district improvements.

The belief now is that Congress will pass one of these measures.

**"Beneficial Use" of Water Now Good Law**

The decision of Judge Lockwood, of the Superior Court of Arizona, which has been "hatching" for nearly two years, is epoch-making in its effect on the irrigated west. It is in full accord with the legislation in California and in other western states which insists on the "beneficial use" of water as against the "speculative use." The creation of the Water Commission in California a year ago made it clear that water was for "use" and not for "abuse." Judge Lockwood's decision makes it clear that an appropriation of water means putting the same to a beneficial use and that a lapse of five years would constitute abandonment of an appropriation. He also applied the doctrine of relation in cases where an appropriator owning a large body of land and applied only a small quantity of water at first, but used reasonable diligence in bringing the balance of his land into cultivation.

Said Judge Lockwood: "It is not fair to the public nor to future generations that a settler, once having initiated a water right, can fail to use the water, and making no effort to recover it, even though the initial failure was not his fault, sit idly by and by mere declarations of intention, and a hope of future water supply, hold a right which would necessarily debar other actual settlers from coming in and making improvements and developing the country."

**Secretary Lane Endorses the Orland-Mead "Loan" Plan**

Owing to the crowded condition of the columns of THE IRRIGATION AGE, the report of the meeting at Orland, held during March, and which was omitted from the April issue, appears in this number. Since the meeting there have been important developments which practically assure the experiment. Secretary Lane's visit to the Pacific Coast was made the occasion of a conference at which the Orland experimental rural

credit plan received his unqualified endorsement.

The Interior Department is thoroughly conversant, it was brought out at the conference, with the conditions at Orland, with the proposed remedy and with the possibilities of putting an appropriation through Congress at this session. In fact, the department is now working on a scheme of financing the proposition, which, of course, must be looked at by them with all the reclamation projects ultimately under the scheme, so that the proposed bonds will not prove a drain on the general funds. It is possible that the reclamation construction work will be used as security for the bonds issued in each project.

The conference was in the nature of an informal talk, each offering ideas or details for what they were worth. There was no doubt left that Mr. Lane is not only in favor of the Mead plan, but that the Orland project shall be one of the first in which the proposed rural credits and land settlement project plan shall be tried out.

**California's Water Board Doing Some Fine Work**

California's new Water Commission is to be congratulated on the method in which it is making effective the intent of the new law—that the sole use of water is for "beneficial" ends.

On the approval of an application by the commission, a permit is issued, which assures to the applicant his right to the use of the waters involved and to none other. But no license is issued to him as proof of his water-right until he has complied with all the provisions of the permit—that is, has done all those things which he set forth in his application that he would do, and contingent on which his license issues.

Prior appropriators on a stream are notified of the new application. They may protest on one or many grounds, for instance: That the natural flow of the stream is already used by prior appropriation or that the application may cover other rights. All these matters are heard and a determination reached only after all possible facts have been adduced. It is just as important to the applicant that his application be denied, if there is any question as to its legality, as it is to the protestant, both of whom are protected thereby from useless expense and perhaps costly and interminable litigation.

The Water Commission is, therefore, a clearing house of information for the intending appropriator and others, aiding and assisting them in divers ways. Reverting to the all-important doctrine of "beneficial use," the appropriator must continue to apply the waters to such "beneficial use," or same will revert to the state.



### Rural Credits Bill Prepared for Oregon Voters

The Oregon Drainage, Irrigation and Rural Credits Conference, which had some hard sledding at the Salem convention, has now drafted the measure which is to be submitted to the people of Oregon. The *Portland Telegram* has this to say of the proposed legislation:

"The first essential is to have a law that is genuinely a rural credit law and nothing else. The second essential is to provide for simple machinery and minimum expense in the administration of the law. The third essential is that the moral as well as the financial quality of the security to be accepted shall be established and maintained throughout the life of the loan. The fourth essential is that the interest rate should be low and the terms of payment such that the obligation may be met with reasonable certainty from the improved conditions which the use of the money borrowed will bring about. A fifth, but by no means the least important feature, should be an administrative system that will prevent the money being used to boost the speculative value of farm lands.

"The foregoing enumeration does not preclude the consideration of other important features, but it indicates in the outline what a rural credit law should be to give the farmer maximum help and the state maximum service properly, safeguarded against loss or exploitation in any direction.

"The tentative draft of the bill submitted embodies these points. Its purpose is clearly and distinctly to furnish the farmers of Oregon with the money they need at the lowest practicable cost. It creates no new commission for administration. It provides that all initial expense shall be borne by the borrowers. It keeps whatever administrative expense there may be, aside from that, strictly under the eye of the legislature, and consequently within the knowledge of the people. It provides for investigation as to the character of the borrower and the purpose for which the loan is asked. It makes that purpose a condition expressed in the note. It requires supervision calculated to secure the fulfillment of the contract in this as in all other respects. It limits the amount of the loan per acre. It seeks to propose a law that shall be really what it purports to be—a rural credit law in aid of Oregon agricultural development.

"This measure should be subjected by thinking people to analytical discussion. There should be willingness on every side to help the committee perfect it."

### GOVERNMENT EMPHASIZES NEED OF WATER USERS ASSOCIATION

Mr. F. G. Hough, manager of the Truckee-Carson project, has issued a circular addressed to the Water Users in his district, which, in the opinion of *THE IRRIGATION AGE* is of great value to all the reclaimed west. We publish his letter in full, as it is well worth the attention of water users everywhere:

#### The Circular Letter

The project office is in receipt of a circular letter from Director A. P. Davis in which the following quotation is given from a letter to the director from the First Assistant Secretary of the Interior:

"In the consideration of the claim for damages of H. G. Stewart, North Platte Project, Nebraska, I find in the record a letter from Project Manager Andrew Weiss, of Mitchell, Nebraska, to the Chief of Construction, Denver, Colorado, in which it is suggested

that this or any other similar matter be referred to the Board of Directors of the North Platte Valley Water Users Association prior to the settling of such claims, unless settlement be made of a special appropriation by Congress without charge against the project. This would be in accord with the Mutual Amendment of June 3, 1914, regarding acquisition of lands.

"The suggestion of Mr. Weiss should, in my judgment, be followed in this case and in other similar cases. You are accordingly directed to secure from the Board of Directors of the North Platte Valley Water Users Association a report upon the facts relative to the claim of Stewart, together with such recommendation as the association may deem proper."

This furnishes an excellent illustration of the value to the project of a water users' association and of the assistance that it can give to the project manager in conducting the business of the project. There are many other matters which it would be desirable to have the authorized board of directors of an official water users' association consider before action is taken. Among these are the frequent requests received from water users for betterments in the arrangement of ditches, drains or structures. These betterments must be charged to the operation and maintenance account and tend to increase the amount to be paid by water users, yet in many cases the changes requested would be very desirable and no doubt a water users' board authorized to act for the majority would feel disposed to approve work of this kind possessing real merit and manifestly necessary for the proper protection of the water user or for the more efficient operation of the system. The project manager hesitates, however, to make expenditures of this kind which will increase the maintenance cost without the co-operation and advice of a representative body of water users.

A duly authorized board of directors could also assist the project office greatly in coming to a proper decision on various complaints made by water users, also in handling and adjusting complaints made by the Reclamation employees of improper handling of the water by water users. In many instances condi-

(Continued on Page 107.)



## ELWOOD MEAD OUTLINES HIS RURAL CREDIT EXPERIMENT.

The Orland, California, Reclamation project extension has been thrown open to the settlers, the date fixed by the government being June 15.

It is especially interesting, as it is to be the scene of a great object lesson in rural credits if Secretary Lane and Congress approve the plan suggested by Dr. Elwood Mead.

On March 8 a celebration was held at Orland, and the principal speaker was Dr. Mead. The following reprint of that meeting is taken from the columns of the *Orland Register*, of March 8:

"We are not only attempting to bring about a new development in the land system, needed here at Orland, but to make Orland the object lesson of one of the greatest reforms in rural development in the United States."

Dr. Mead with these opening remarks gave the keynote of his entire address before the local water users last Saturday afternoon. He brought home most impressively that the Orland project is to be used as a means whereby the system might be applied to every farming community in the West.

Dr. Mead, who was introduced by President Lindstrom of the Board of Directors, explained the proposed land settlement project according to the Australian plan, told of the need in every new country for such a credit system, and explained the action necessary to obtain favorable consideration.

The proposed credit plan would be to the young farmer and the poor farmer of this generation what the homestead act was to the past generation. It would not only affect the local project, but would have a great quickening influence on the rural life of the entire country, declared Dr. Mead. The homestead act made this country a nation of farm owners. We are fast losing this distinction, becoming tenant farmers, because of the inability of the young man to get a start without large capital. There are no 160 acres of Iowa land which can be homesteaded. Land is high, water is high, labor is high and equipment is much higher.

Dr. Mead showed by statistics from six irrigation districts in California that the financial conditions were almost insurmountable. The average holding was twenty acres, costing \$190 an acre, the initial capital was \$3,130, while the first payment was \$1,384 with the first improvements, \$904, leaving for working capital only \$750. This amount is left to meet a short term debt of \$2,512 and to pay an annual interest of \$197. Added to this was the average income for the first year which varied from \$85 to \$400. Could the interest charge—8 to 9 per cent—be cut in half and the repayment of the debt extend over twenty or thirty years these people would be sure of success.

"The high rate of interest charged the farmers, who are the greatest creators of wealth in the nation today is the greatest menace to the success of the rural population today."

Added to this prime cause of failure on new tracts is the waste and loss due to lack of organi-

zation. Cut your interest rate in half, extend the time for repayment to a long period, complete organization in every activity and you have cut the risk of land settlement in half. This has been proven time and again by actual experiments in Denmark, Ireland and Australia.

In 1899 Denmark was poverty-stricken and the young men were emigrating in great numbers. The government in order to stop this, bought 40,000 farms, turning them over to the young men on long time payments, advancing nine-tenths of the money for improvements. Fifty years was given to repay these loans, interest being charged at 3 per cent and one per cent being paid on the principal each year. The plan stopped emigration, placed Denmark among the most prosperous countries in Europe.

The same thing has been accomplished in Ireland, to such a success that Irish newspapers refuse advertisements for settlers from other countries, claiming that the thing they have fought for, has been brought about in Ireland by the government, namely, Ireland for the farmers of Ireland.

Australia offers a striking parallel to California. The same conditions and sequence of events prevail in both sections. First, the gold rush, then the great grain rush and finally the small farms. The system, which is recommended for the Orland project, was put into effect in 1910, when the farmer was paying nine per cent on short time loans. Now he pays  $4\frac{1}{2}$  per cent interest and  $1\frac{1}{2}$  per cent on the principal each year, so that at the end of thirty-one years his entire debt is paid he having paid six per cent annually on the original debt— $4\frac{1}{2}$  per cent interest and  $1\frac{1}{2}$  per cent on the principal. Of course the  $4\frac{1}{2}$  per cent interest is interest on the amount remaining unpaid so that each year the amount paid on the principal increases with the decrease of the interest total.

The Australian also includes a scheme whereby the lack of organization is done away with. Instead of buying raw land with only the water right, the farmer buys land leveled and seeded, with a farm house and buildings erected. He goes onto the land and is ready to make a living the first year. The expense of individual leveling, building, etc., and the loss of time is done away with. A thousand acres are leveled and seeded by the government at once in the most scientific manner. A dozen houses, each with its own individuality but all with certain features which are duplications, are erected at once. The government is able to take advantage of buying and working in large quantities. The mistakes made by each individual farmer and the loss of time and effort is entirely eliminated. An expert farm adviser is also at hand to aid the settler.

Dr. Mead showed by half a dozen instances that the system is not paternalism in that it does not kill individual initiative. Reducing a man's interest charge from nine per cent on a short time loan to  $4\frac{1}{2}$  per cent on a thirty-one year loan, is hardly paternalism. Of course this debt need not run the



full time, as provision is made to pay it off at any time.

Dr. Mead is very anxious that young men be placed on the excess land and to assure this, he has asked every farm adviser in the state to secure a list of young men who would want to make application for land here under the proposed plan.

Orland to secure the attention of Congress as the project on which to locate this land settlement project must show two things, namely; that the people have tried to make a go of it under present conditions and not only have had a hard time meeting obligations but the burden is too heavy and they are now in a type of agricultural slavery; and that the proposed 9,000 excess acreage on which the

## HOW TO USE WATER, GAS TAR AND COAL TAR ON CONCRETE

The work on the Arrowrock dam in the Boise, Idaho, project has demonstrated to a nicety the use of water, gas tar and coal tar on concrete when subjected to high velocities of water. The report of the construction engineer, Charles H. Paul, issued in January, states that the idea at Arrowrock was not so much that of waterproofing as to fill all the minute voids in the surface of the outlets, so as to prevent, if possible, the erosion caused by the formation of vacuum in small voids or pockets. Preliminary experiments had indicated that the water-gas tar would penetrate the concrete, and



THE ROOSEVELT DAM—SALT RIVER PROJECT, ARIZONA. The Roosevelt Dam stores water for lands in the Salt River Valley. These lands, under a perfect irrigation system, afford one of the best farming opportunities in the United States.

plan in full detail would be carried out, can be put into the settlers' hands without a string of commission and other charges.

### WANTS LIST OF IRRIGATION PROJECTS

A resolution by Senator Works of California has been adopted by the Senate asking the Secretary of the Interior to report to the Senate all facts concerning irrigation projects completed, under way or contemplated, and the amount of acres reclaimed by each or susceptible of reclamation.

that the coal tar would follow it in and bind to the concrete much better than if it were applied direct, thereby completely filling the voids at and near the surface and coating the concrete with a slick and fairly durable finish, cheap and easily applied.

This coating was applied to all outlets during the fall of 1914. Five of the lower outlets, and six of the upper outlets were in service during the irrigation season of 1915, some of them working for four and one-half months under heads varying up



to a maximum of 100 feet, with corresponding velocities up to 64 feet per second.

All of them passed through a fairly normal winter and summer. The one that was used most was operated nearly all the time with its valve only partly open, which is a less favorable condition than with the valve wide open. After this service, careful inspection was made, and the tar coating was found to be in excellent condition. In a few small spots the outer coating had come off, but even there the concrete surface was well filled with the tar and was still well protected, apparently, against water action. It is the opinion of the men familiar with all conditions that the use of this tar coating gave thoroughly satisfactory results.

In obtaining material for work of this kind it is very important that the water-gas tar be of very thin consistency. The manufacturers can supply it that way if it is made plain to them that this thin consistency is important, otherwise it is likely to come too thick. The manufacturers can also supply an oil for thinning this water-gas tar, and it is advisable to have some of this oil on the job in case it is needed, but it is believed that the success of the whole operation depends upon the very thin, water-like consistency of the water-gas tar. Both the water-gas tar and the coal tar should be refined.

It is necessary to have the concrete thoroughly dry at the time the first coat is applied. The water-gas tar may be applied without heating, and the second coat may follow the first immediately. The first coat of coal tar may be applied as soon as the water-gas tar has soaked in a little, but the second coat of coal tar should not be applied until after the first coat has set. Both coats of coal tar should be applied hot and brushed out as thin as possible, as a thick coating is much more likely to peel and run.

The following from a recent issue of The Australian Fruit World is interesting in this connection:

To increase the water-tightness of concrete, especially to (lean) mixtures, clay has been added. The clay must be free from all vegetable matter, and when added must be in a finely-powdered state. The amount to be added must vary with the mixture; for ordinary farm work add about two to five per cent of the weight of sand used in the mixture. Mix dry with the cement.

The addition of soap and alum to cement mortar has been found to diminish the permeability, and the following has been found to give good results: "Take one part cement and two and one-half parts of clean, sharp sand, and to every cubic foot of sand add three-quarters of a pound of powdered alum. This should all be mixed dry. Now add water in which has been dissolved three-quarters of a pound of ordinary laundry soap to the gallon, and thoroughly mix." If you find it difficult to dissolve the soap, use hot water. The strength of the mortar will, of course, be somewhat inferior to that of the pure mixture.

Alum and lye applied to the exterior surface with a calcimining brush has been found effective. "Use one pound of lye and three pounds of alum dissolved in two gallons of water."

## COLORADO DEMANDS ADEQUATE DRAINAGE

BY ADELBERT A. WEILAND, STATE ENGINEER OF COLORADO.

As regards the ultimate development of our irrigation possibilities, we have hardly started, and have, in fact, only scratched the surface. As an example of this fact, take the Arkansas Valley from Pueblo to the Colorado-Kansas line. There is now irrigated, from the Arkansas river, between the points mentioned, only 350,000 acres, with an average annual water supply actually diverted into the canals of over 1,000,000 acre-feet. Compare this with the irrigation from the Cache le Poudre river in northern Colorado. With an average annual diversion of little in excess of one-third that of the Arkansas Valley, here is actually irrigated nearly 300,000 acres of land. One cannot but be led to the inevitable conclusion that the acreage in the Arkansas Valley must be doubled, and that, too, within the next twenty years. This being true of one section of the state, which has been farmed for thirty years, how much more must it be true of other sections of more recent development?

In order to create more wealth, the large farms must be divided into smaller holdings; we must have more farmers—men, too, who are alive to the duty incumbent upon them to make the most out of the natural resources, land and water, placed in their keeping. The duty of water must be doubled, and it can be by intelligent cultivation and supervision.

There is a crying demand in our state for adequate drainage. Accompanying irrigation everywhere, there is the evil of water logging the soil from over-irrigation or from physical conditions due to the topography of the country. While no accurate survey of the seepage lands has been made, yet it has been quite accurately estimated as 2,000,000 acres. While some drainage development has been undertaken in the various sections of the state, yet hardly a beginning has been made in this work. We have adequate drainage laws on our statute books, but prospective investors in the bonds seem to fear the validity of the law, and have desired a Supreme court decision relative to the validity of the bond issue. No case has yet been presented to the court.

There exists at the present time approximately 800,000 acres of land in the heart of the San Luis Valley that needs only drainage to make it one of the most productive portions of the state. Two drainage projects, one near Center and one southwest of Alamosa, have been developed, and the results obtained under both propositions amply attest the success and feasibility of drainage, and the crops produced on the drain lands are ample to convince the most pessimistic purchaser of the bonds of a drainage district, that the security is ample and safe. All the help possible must be secured from all sections toward financing the drainage propositions, for it is only by this means that we can reach the ultimate development so much desired.

The development work on new projects has



been practically held up for the last two years. While there has been considerable activity in the filing upon new projects, there has been little actual construction work. During the calendar year 1915 practically 900 new projects, which includes ditches and reservoirs, have been filed upon. During the same calendar year only seven reservoirs have been built or enlarged.

Colorado, as a state, has suffered in the past from too much exploitation of irrigation schemes without any merit whatever. We are, in a measure, recovering from the ill effects of this hyper-enthusiasm, and Eastern capital seems much more willing to put money into our irrigation and drainage securities. As this feeling of confidence in our developments continues to grow it is incumbent upon every citizen of this state to see that only bona fide propositions be placed before Eastern capital.—Denver Post.

### MAKING "GROUND WATER" SURVEY

Washington letter in Christian Science Monitor: One of the big recent developments in the building up of the arid and semi-arid states is the recovery of underground water for irrigation. Formerly nearly all irrigation supplies were derived from surface streams, but two conditions have in recent years directed attention to the valuable supplies of water which are stored in the huge subterranean reservoirs underlying many of the desert areas of the West and which can be tapped by drilling wells. The first of these conditions is the rapid exhaustion of unappropriated surface supplies and the necessity of finding other supplies if the irrigation of the arid lands is to be extended; the second is the reduction in the cost of pumping due to improvements in pumps and development of internal-combustion engines, and the installation of large hydroelectric power plants.

When the last federal census was taken more than a half million acres of land was irrigated in the United States with water supplied by wells, about three-fourths of which was pumped, the rest rising to the surface by artesian pressure. Since that time progress has been made in the recovery of underground water. At first ground-water irrigation was almost wholly confined to a few regions, such as southern California, the Pecos valley, and the Arkansas valley, but now nearly all parts of the West are being prospected for ground-water supplies.

Owing to the diversity in geologic conditions, the occurrence of underground water differs greatly from place to place. Many of the desert valleys have large and valuable supplies; but others which appear no less promising to the casual observer have little or no underground water or only water that is too deep to be profitably pumped or too alkaline to be used for irrigation. The uncertainties attending ground-water developments are causing great loss to thousands of uninformed and inexperienced settlers and are providing unscrupulous promoters with opportunities for misrepresentation.

Long before the interest in underground water had become as general as it is today the geological survey foresaw the need of a detailed ground-water survey of the entire West, and for years it has been

engaged upon such a survey. Each year certain areas are selected for systematic investigation, the plan being ultimately to cover the entire West. A vast amount of reliable information has thus been obtained on the quantity, depth and quality of the water, the prospects for artesian flows, the best methods of constructing wells, the cost of drilling and pumping, and other matters relating to the recovery and utilization of the underground supplies, and maps are made showing the ground-water conditions. The maps and data are published in a series of water-supply papers.

The region to be covered is, however, so extensive and the funds available for water resources investigations have been comparatively so small that large areas remain in regard to which there is no definite information, and many years will be required at the present rate of progress to cover all of these areas, provided the work is to be done with the thoroughness that is essential to make it useful. Every year many requests for investigations of specific areas are received, some of them in the form of long petitions signed by the settlers. All these requests are given careful consideration.

### THE ADVANTAGES OF METAL FLUMES

THE IRRIGATION AGE is in receipt of the catalog of "The Armco Iron Culvert and Flume Manufacturers Association." It fairly teems with information which is bound to be extremely useful to all power plants and mining and irrigation engineers, for much of it is new and the result of the most painstaking investigations.

The day of the wooden flume, like the day of the wooden bridge, has passed, and the irrigationist has learned that the erection of a metal flume is a measure of true economy, as he may thus avoid the yearly troubles and expense of a wooden flume.

The best of wooden flumes warp, crack, leak and soon rot out, and the waste of water in a single season represents a serious loss.

The season's losses in long wooden flumes from leakage and reduced capacity resulting from obstructed interior surfaces, capitalized at prevailing rates of interest, will go far toward replacement with an efficient, long lived, water tight metal structure.

The carrying capacity of a metal flume remains always the same while that of a wooden flume becomes decidedly less with warping and patching.

There is less weight on the sub-structure of a metal flume than on that of a wooden flume which has been soaked with water.

The sub-structure of a metal flume will last much longer than that under a wooden one, as the leaking of a wooden flume soon rots the timber work, and in some cases softens the foundations so as to weaken the structure and require repairs.

An Armco Iron Flume is an investment of permanence. It adds to the value and to the appearance of the property on which it is installed.

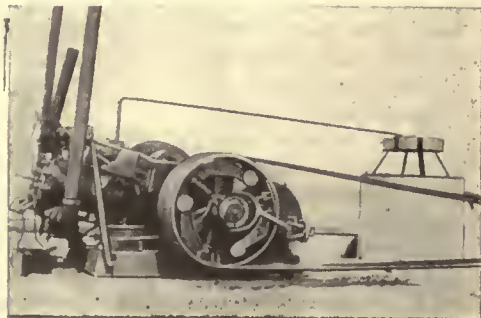
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IRRIGATION.**



## WHERE OIL AND WATER MIX

L. J. Cunniff.

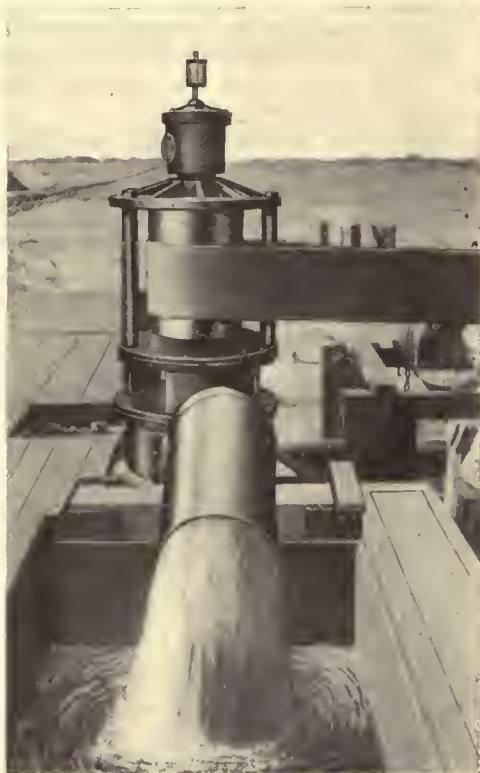
In the West and Southwest, where nature has been just a little niggardly in supplying rain, the best crop producer is a mixture of oil and water.



The Cause.

Big irrigation projects have been adding such vast areas to the farm domain that the importance of irrigation by pumping is not recognized as it should be.

Of course, it is only possible to irrigate by pumping where an ample under-flow of water can be secured, but there are thousands of acres of land in the West and Southwest that can be easily irri-



The Effect.

Oil-Turn Motor on the Farm of G. G. Fuller, Pumping at the Rate of 300 Miners' Inches per Minute and Burning "Stove Tops" for Fuel.

gated in this way. There are very few regions where a supply of water that will raise to within forty or fifty feet of the surface cannot be reached by a shallow well.

The cost of irrigation by pumping compares very favorably with irrigation costs when the water

is obtained through some of the big project companies. We illustrate on this page an outfit belonging to G. G. Fuller of Phoenix, Arizona, which cost less than \$6,000 and which supplies water to a 440-acre farm at a cost of less than \$7.50 per day.

The entire cost of putting down the well, the Oil Turn motor, oil supply tank and wagon tank are all figured in the \$6,000. Fuller's outfit will pump 300 gallons of water per minute, raising the water thirty feet. When operating at full capacity the motor will consume about sixty gallons of oil, which costs about \$3.30. It will take \$1.20 for lubricating oil and \$3.00 for an engineer, which makes a grand total of \$7.50 for a ten-hour day.

The cost of a pumping outfit must not be looked upon as an expense. It is an investment and a good one at that. A farm, where such an outfit has been intelligently installed, is worth and will sell for just that much more. Irrigated land in southern California that will not bring \$1,000 per acre is looked upon with suspicion.

Before going into irrigation, however, it is only good business to compare the value of the increase in crops that may be reasonably expected with the



30-60 Oil-Pull Tractor on the Ranch of Dr. White Near Plainview, Texas, Pumping 2,333 Gallons per Minute. The Tractor Is Here Lifting the Water 75 Feet.

cost of an irrigating outfit. Fuller figures that his alfalfa crop brings in a net profit of \$36.90 per acre after taking out the irrigation and other costs. He allows eight per cent on the money invested in the plant and ten per cent for depreciation of the plant itself when figuring profits. There is plenty of land now idle in the West and Southwest that will bring just as big returns with the same treatment.

In buying a pumping engine, reliability is the first thing that should be considered. An engine that cannot be depended upon at all times is worse than valueless for irrigation purposes, so while it is well to keep an eye on costs, a cheap irrigation engine is often the most expensive purchase that can be made.

When the volume of water used in irrigating is small, there is a much greater percentage of waste than where the volume is large, as there is a much greater chance for evaporation and more opportunity for other wastes where the water is supplied slowly. Because of this the larger the pumping outfit employed the greater the economy shown.

Tractors can often be very advantageously used for pumping power in irrigating small plots of land, as tractors may be put at other work when not pumping. The oil tractor shows practically the same operating costs as the oil motor. Both burn the low grade oils equally well. A tractor will of course cost a little more, but this increase is more than off-set by the ability of the tractor to haul, plow, seed or thrash when it is not working at the pump.



(Continued from Page 101.)

tions exist on farms which necessitate operating the laterals in a manner dangerous to the system and these conditions can be and should be remedied by the farmer. For the protection of the system, the elimination of unnecessary costs of operation and maintenance, and the protection of other water users, it is the duty of the project manager to endeavor to have these harmful conditions removed, and it is also the duty of the water users' association, a duty that is now being evaded on this project, to lend its support and assistance to the correction of these conditions.

It would also be in the province of a properly organized water users' association or district to take up the subject of project drainage and settlement, as well as all other movements looking to the advancement and betterment of the irrigation system and of the project in general. No small part of its duties would be to procure and disseminate among water users full and correct information with regard to all matters of interest in connection with the conduct or project business by the Reclamation Service. Through the performance of this duty a great deal of dissatisfaction based on misunderstandings could be obviated and at the same time by taking an interest in these matters and by providing for full publicity, anything undesirable or improper in the project organization or plans could be quickly brought to light and promptly remedied.

It should be understood by all water users that they share in the responsibility for the advancement of the project and the conduct of its business. It will not do to lean on the Reclamation Service or let someone else do the work. The success of this or any other project depends in a large measure on the interest taken by the farmers and the helpful exercise of their influence and power through well-organized associations or districts.

One of the principal differences between the Truckee-Carson project and other projects of the Reclamation Service today lies in the matter of organization. The projects that are making the most rapid advancement, that are securing the advantages open to them under the terms of the Reclamation Extension act for securing drainage and other improvements, and are taking active steps to divert settlement their way, are those projects on which the water users are organized in strong and efficient working bodies.

It is pleasing to note that progress toward an organization of this kind is being made on this project through the efforts of the general board of the water users, consisting of the boards of directors of the informal associations in the various districts. More of the spirit of harmony among water users has been manifested during the past year than previously, and undoubtedly the time is here for the organization of a legal water users' association or district that will represent all water users and will be empowered to take official action for them. The efforts of the general board in this direction are worthy of the support of all water users and it is to be hoped that they will continue their efforts unceasingly and to a successful issue.

Mr. Water User, the project officers need your active organized support. Will you do your share?

### UNCLE SAM'S "IRRIGATION" SCHOOL

Over against the time when the farmers on the reclamation projects of the west will take over and manage for themselves the great irrigation systems now under government control, Uncle Sam, through the reclamation service, is taking every opportunity to give them experience in practical business affairs. One of the most important steps of this sort is being taken just now by encouraging the project associations of water users to become real estate agents. Incidentally, while by this procedure the future owners of the important irrigation plants will be given an opportunity to train their business ability, the government will also be helped in solving one of the big problems in connection with the reclamation work—the prompt and proper disposal of the thousands of acres of privately owned unutilized lands on the projects.

When the federal reclamation work was first planned it was meant primarily to reclaim public lands that could be offered to the homesteader for merely the pro-rated cost of constructing the dams, ditches and other works. But much land in the available irrigable areas had already passed into private hands, it was soon found. For a time it was even planned to ignore this land, and to build the ditches around it solely for the benefit of the government land. This was seen, however, to be impracticable, so the private land was admitted to the irrigation benefits for the same payment per acre as that exacted from entrymen on the public lands.

One important stipulation was made, however. The private lands must be subdivided to the project unit, and sold within a period after completion of the project, to be set by the Secretary of the Interior. The secretary is about to fix the period for a number of the projects, and the reclamation service has suggested that it would be to the advantage of all parties to stimulate the sale of this unused land to first-class farmers before it will have to be sold at auction.

The plan put forward by the government is for the existing project associations, made up of all the water users, to take options in due commercial form on the private lands that must be sold and then to make efforts to negotiate sales. The idea is to do away with all suggestion of "boom" methods and the desire that usually goes with them to "catch suckers," and to be sure instead that every purchaser shall receive a square deal. In encouraging the water associations to go into the real estate business the reclamation service officials have cautioned them to take options only at prices that they would be willing to pay if purchasing for themselves.

The plan has appealed to the associations on a number of the projects, and some have taken it up in a thoroughgoing way. These not only have employed experienced real estate men to negotiate sales, but have also hired soil experts to make a careful examination of the various tracts in order that they may advise prospective purchasers on all points.



## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### California

The Sacramento Valley Irrigation Company has been succeeded by the Superior California Farm Lands Company.

Practically all irrigation suits brought by the Poplar Irrigation Company against water users taking their supply from the Tule river have been settled by arbitration.

The decision of the Sacramento land office in the Becker's Ford reservoir contest, Patton vs. Walker, was sustained in April by Secretary of the Interior Franklin K. Lane, and a right of way for the use of the public land affected granted to E. R. Walker of Sacramento, promoter of the 40,000-acre irrigation project in that country. The decision of the secretary closes the largest case handled by the Sacramento office, for from the secretary's ruling there is no appeal. The case has been pending about five years.

The last construction work on the Glenn county end of the Western canal near Butte City was finished when Harlan & Cameron completed their three-mile contract. Water from the Feather river near Oroville was turned into the big ditch early in April, and it is now available to all the growers on the 7,000-acre rice project. Harlan & Cameron are now moving their outfit into Butte county near Oroville, where they have a contract for moving 20,000 cubic yards of earth from the main canal.

Governor Hiram W. Johnson has just named A. E. Chandler, Berkeley; D. W. Ross, Willows, and W. P. Boone, Dinuba, as members of the State Irrigation Board. The appointments are in accordance with the Irrigation Act of the session of 1915. The board will have offices in Sacramento and will co-operate with the State Water Commission.

Prospects for the taking over of the irrigation system of the Kuhn syndicate in Colusa and Glenn counties appears more favorable as time passes. The latest sections to decide to form irrigation districts are Codora and Princeton. At a recent meeting nearly all the land owners present signed a petition asking the board of supervisors to call an election for the organization of the district, which will comprise about 18,000 acres lying under the river branch canal.

An irrigation district of 37,800 acres is under process of organization. The land lies on the north and east side of Honey Lake valley, starting at the confluence of the Susan river and Willow creek and stretching in a shoe-string around the base of the mountains on the north side of the valley as far as Skeedaddle creek.

The government has restored the irrigation system for the agriculturists of the Rincon Indian reservation, northeast of Escondido, beyond what is known as the Valley Center country.

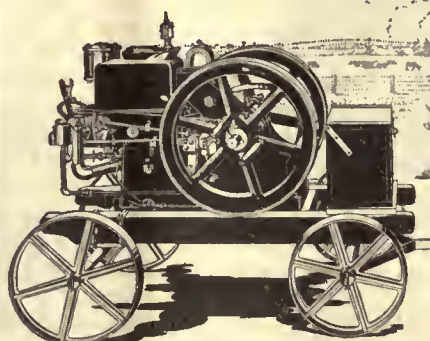
It has been announced by Richard White of Chico, attorney for the Paradise Irrigation District, that a bond election would be called during the late summer to provide for the construction of a reservoir and dam, a distributing plant and ditches for the district. The cost of the entire project, which ultimately will include two reservoirs, will be about \$275,000, but the initial bond issue probably would not exceed \$100,000. The district, according to White, is one of the first to be organized in California where the territory is almost exclusively foothill and horticultural lands.

### Oregon

The Desert Land Board has notified officials of the Central Oregon Irrigation Company that it must not sell water to lands on the project not now obligated to be served under the company's canal unless first a cancellation of an equal amount of irrigable lands for which the canal is now obligated is executed. The board also decided that in view of the present deficiency as shown by the board's investigations, no additional sales will be approved which will increase the liability of the canal.

R. W. Rea, hydraulic engineer, of Portland, has been engaged by the Ochoco Irrigation District, in Crook county, to make surveys and prepare plans, specifications and estimates of cost of constructing a complete irrigation system for reclaiming about

## Power for Forty Farms



**Mogul and Titan Engines**



**T**WENTY Titan engines of all sizes, all kerosene burners, were lined up in front of the I H C dealer's store at Litchfield, Minn., one day last summer. That day their new owners took them out to supply good, reliable power on twenty farms. A few months later Litchfield saw twenty more farmers take Titan engines out to their farms.

Two big I H C engine delivery days in that town last year. In many hundreds of towns you will find this same popularity of I H C Mogul and Titan engines—the best farm power—Grand Prize winners at San Francisco.

You must have an engine—then buy an International Harvester engine—Mogul or Titan. It will keep down your fuel and repair bills, deliver the most power with least trouble, and save you more hard work than you can realize now.

International Harvester engines are made in all approved styles, sizes from 1 to 50-horse power, operating on low as well as high-grade fuels. Some local dealer near you handles Mogul or Titan engines. If you don't know him, drop us a line. We'll send you full information, and make it easy for you to get the best farm engine made.

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20,000 acres of land. It is proposed to include in the system an earth-fill dam to store 40,000 acre-feet of water in Ochoco creek.

At the election in the north unit of the Deschutes project, in April, the district proposition carried by a 65 per cent vote. All of the five precincts in the district gave a majority vote in favor of the district. The election was for the purpose of organizing a district for the purpose of bonding the land, so that it can be irrigated. After the district is organized, another election will have to be held to authorize the bonds. It is estimated that the land can be watered for less than \$55 an acre. This is the figure reached by the engineers who surveyed it a few years ago, but the government engineers say that it can be done even for less. It is agreed among all who are familiar with the land that irrigation will enable the farmers to grow hay, grain, alfalfa, potatoes and other vegetables, as well as some varieties of fruit, in profusion. The elevation is about 3,000 feet. The plan is to take the water out of the Deschutes river at a point a short distance south of Bend, and to convey it through canals and flumes to the area that it is proposed to irrigate. It would be conveyed across the Crooked river at a high elevation.

#### Oklahoma

The reclamation commission has agreed to begin work immediately upon Lawton's irrigation project. The appropriation available would have reverted back to the government, June 30, and business men here were growing uneasy over the situation. Two thousand five hundred acres of land north of Lawton will be irrigated, including 600 acres of government land

near the Fort Sill Indian School. Water will be secured from the big city reservoir. One hundred thousand dollars was originally appropriated for the project. If irrigation in this section proves feasible, the government has unofficially

#### Utah

An irrigation company, which will be one of the largest in Utah, will start work in Parowan valley, Iron county, this summer, according to information given out yesterday. The company will be incorporated today for \$1,000,000. It will irrigate 40,000 acres of land with water now controlled by water right. Officers of the new company will be James J. Toy, president; W. L. Cook, secretary, and Judges D. D. Houtz and Joshua Greenwood, directors.

#### New Mexico

The application of the Arlington Land Company to appropriate water from the Chama and Brazos rivers, tributaries of the Rio Grande, for the irrigation of land in Rio Arriba county, which was approved by the State

Board of Water Commissioners after State Engineer French had declined to do so, has been made a matter of record in the state engineer's office, and the company is now at liberty to take the water. Mr. French declined to act on the ground that the appropriation of the water to the extent desired by the company would be an infringement of prior rights held by the U. S. Reclamation Service, and the company appealed to the water board from the decision of the state engineer. The plans of the Arlington company contemplate the irrigation of more than 30,000 acres of land.

J. H. Dockweiler of San Francisco, one of the most prominent engineers on the Pacific coast, has undertaken to design and construct a big irrigation project in San Miguel county near Las Vegas, extending from three miles above the Meadow City to six miles below it and covering a territory of more than 17,000 acres. The project involves an expenditure of approximately a half million dollars. Work will begin within the next two months, and Mr. Dockweiler stated

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"I have forty acres of land irrigated by a small stream from the mountains. Have raised 80 bushels of corn to the acre, a ton of onions and 12 tons tomatoes. Alfalfa can be cut four to five times and makes seven to eight tons. Have never seen finer fruit than we raise here—apples, peaches, pears, apricots, grapes, cherries, berries and melons. We have mild winters—healthful and delightful climate."

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There are only 10,000 acres of this rich, volcanic ash soil in the West Okanogan Valley District irrigated and available to homeseekers. This is a genuine and dependable irrigation system—organized, built and controlled entirely by land owners within the district—sound, responsible farmers. The selling price of this land has been definitely fixed by the Directors and is exceedingly

low. Irrigation work completed this spring. Ten to forty acres is the ideal size of farm homes here. This means near neighbors, telephones, electric lights and other modern community advantages.

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at a low cost. Six or eight months in summer they have free range on cheap pastures on adjoining uncultivated lands or U. S. Forest Reserve. Abundance of water. Fine fishing and big game hunting. A farm home in West Okanogan Valley is a permanent security—bound to rapidly increase in value. Send coupon or write today for

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that he expected to have it completed within a year.

At a meeting of the board of directors of the Antelope Valley Irrigation District and the attorneys of Kelly & Kelly, bond buyers of Kansas City, contracts for the sale of \$325,000 in bonds were signed. The bond sale was authorized about two years ago by the land owners of the irrigation district, which is commonly known in this section as the French tract, and funds derived from the sale are to be used for the construction of a new reservoir and intake canals, and the enlargement of reservoir No. 2 and its outlet canals and laterals. The Southwestern Construction Company has been awarded the contract for the new construction work and will begin work within the next three months; \$225,000 in bonds is to be paid for the work. The bond company agreed to accept the remaining \$100,000 at par. The funds obtained from this sale will be used for the settlement of the claims of the creditors of the defunct French Land and Irrigation Company, the original promoters of the project.

#### Colorado

Wayne Pierce of Cheyenne has commenced work on the building of what will be known as the Yerba Draw Irrigation Company project, designed to water 6,000 acres of arid land in the Crow Creek bottoms west of Grover, Colo.

The Orchard Mesa project owners have appealed to the government to make it a part of the U. S. High Line project.

#### Montana

The Madison Valley Irrigation District, comprising about 3,500 acres of deeded land between Ennis and McAllister in Madison county, fifty miles southwest of Bozeman, has been formed, and final survey will be made and rights of way secured within the next few weeks, according to William J. Kremer, engineer in charge of the project, who is in Bozeman from his home at Ennis. Some twenty farmers who are to benefit by the system have secured permission from the state to bond their holdings, and with the capital obtained through the sale of bonds will construct the ditches. The total cost of the construction work, which will be of the most permanent character is estimated at \$30,000.

#### Nebraska

Three hundred and twenty-four applications were made for filings on the thirty pieces of irrigated land which were disposed of by lottery at the Alliance land office in April. An average of nearly eleven applications for each tract, however, there were eighty-two filings for one piece and seven which no one seemed to want.

#### Idaho

An irrigation district is being formed in Malheur county comprising 35,000 acres of rich farming lands extending in a narrow strip on both sides of the Malheur river from the

mouth of the Malheur canyon, seven miles west of Vale, to the Snake river just north of Ontario.

#### Arizona

After several months of most discouraging efforts on the part of W. S. Prouty and others to get a meeting of a committee from the various canal interests in the Florence-Casa Grande valley together for a heart-to-heart talk on a get-together proposition in the valley, a meeting was finally arranged. The meeting was well at-

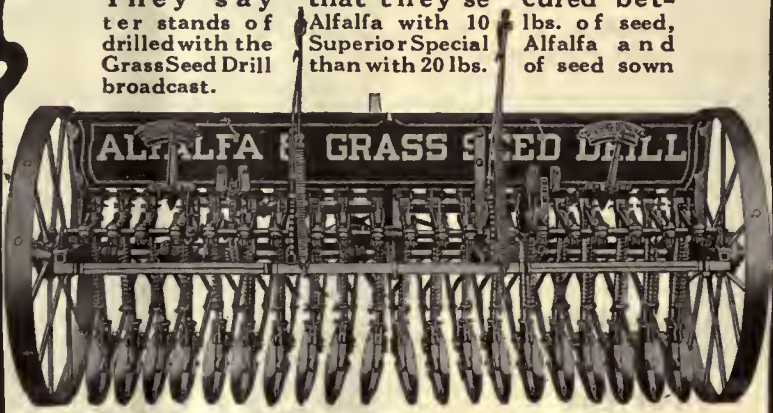
tended, and as a result of that meeting irrigation matters look better in the valley than ever before. Before adjournment was taken the Consolidated Florence-Casa Grande Water Company had been organized with a capital stock fixed at \$250,000, the purpose of the organization being to build a diversion dam on the Gila river and to construct so much of a canal as will divert water to a point accessible to existing canal systems, and to do such other things as the articles of incorporation may provide.

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Medium weight, evenly distributed, giving great pulling power on drawbar.

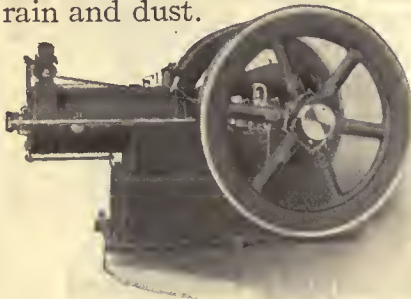
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Motor—4 cylinder, Valves in head	Bearing—Hyatt Roller
Transmission—Sliding Gear	Speeds—Miles per hour, 2½ high, 1½ low
Pulley—440 R. P. M.	Diameter—20", Face—8"
Front wheel—diameter—40"	Face—8"
Drive wheel—diameter—66"	Face—16"
Wheel base—104"	Length over all—161"
Width—84"	Height—8'7"
Approximate road weight—7500 pounds, Tanks Filled	
Approximate shipping weight—7300 pounds	
Capacity gasoline tank—20 gallons	

#### 15-25

Rated Tractive HP.—15	Rated HP. on Belt—25
Motor—4 cylinder, Valves in Head	Bearing—Hyatt Roller
Transmission—Sliding Gear	Speeds—Miles per hour, 2½ high, 1½ low
Pulley—550 R. P. M.	Diam.—14", Face—8"
Front wheel—diameter—32"	Face—6"
Drive wheel—diameter—54"	Face—12"
Wheel base—80"	Length over all—133"
Width—74"	Height—7'7"
Approximate road weight, 5,500 pounds, Tanks filled	
Approximate shipping weight—5,300 pounds	
Capacity gasoline tank—20 gallons	

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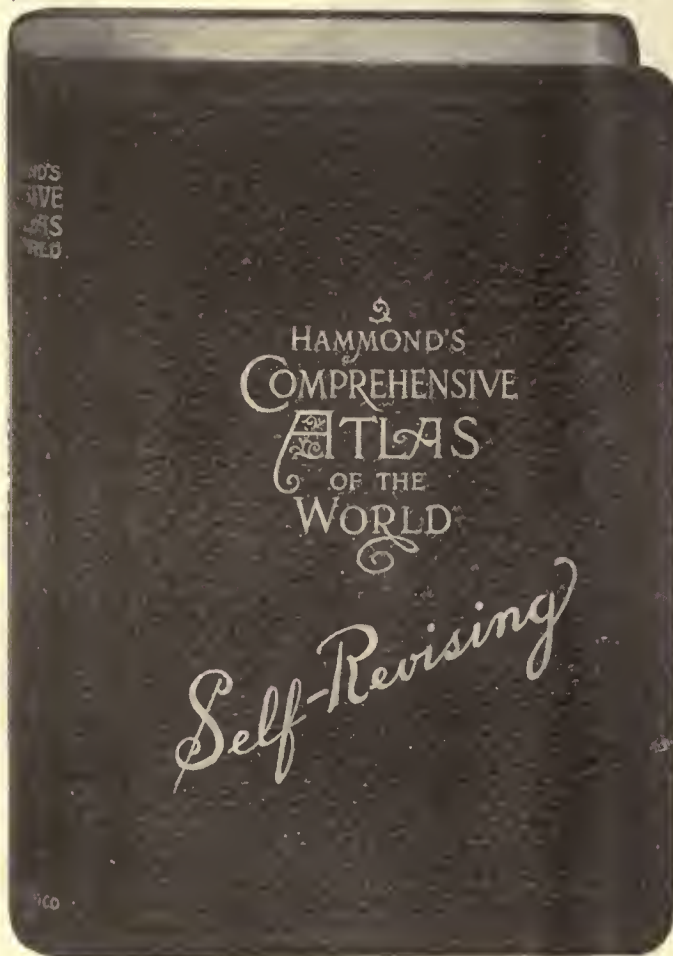
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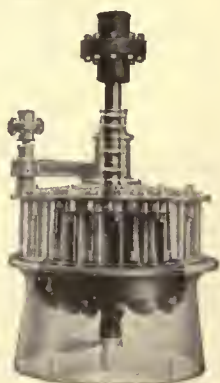
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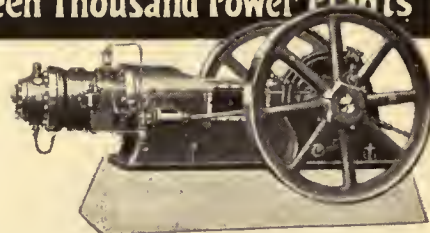
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Thirty-First Year

# THE IRRIGATION AGE

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No. 8

## THE IRRIGATION AGE

With which is Merged

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THE IRRIGATION ERA

ARIZONA AMERICA

THE WATER USERS' BULLETIN

THE DRAINAGE JOURNAL

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## Interesting to Advertisers

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 31 years old and is the pioneer and only publication of its class in the world.

### What Irrigation Has Done

The Federal Government has recently put out a pamphlet which tells about what has been accomplished by the Reclamation Service. The report was evidently prepared by the publicity division of the Interior Department and states that upon lands watered by government irrigation plants last year crops were harvested and sold at prices that brought a grand total of more than \$17,000,000.

Federal irrigation projects now under way or completed embrace over 3,000,000 acres of irrigable land, divided into about 60,000 farms of from 10 to 160 acres. As a result of recent rapid progress water was made available last year from government ditches for 1,450,407 acres on 29,017 farms. In its irrigation work, dams and masonry, earth, crib and rock-fill have been created with a total volume of 12,200,000 cubic yards. These include the two highest dams in the world.

### Settlers' View Of Reclamation

THE IRRIGATION AGE received a communication some time ago from Mr. Edward Gillette, of Wyoming, chairman of the Board of Review, Northern Division, U. S. Reclamation Service; this paper presented the subject of reclamation from the viewpoint of the settler. The entire article appears in this issue of THE AGE and is well worth reading by settlers and Government officials alike.

Particular attention is called to the section wherein Mr. Gillette mentions the conditions confronting a settler in which he emphasizes the fact that only foreigners with large families who are used to the plainest living and who disregard the education of their children, can be successful. The writer states further that conditions should be so changed that American families should be able to succeed.

Mr. Gillette has held the office of State Treasurer of Wyoming and has been brought in such close touch with the settlers and general conditions in his state that his opinion is of value and the article will no doubt be gone over carefully by our readers.

### Annual Congress of Water Users

A movement is on foot to bring the Water Users into a national body and plans are already under way to organize an annual Congress of Water Users who are farming under Reclamation Service projects.

There has been a crying need for an annual Congress of this character where the actual Water Users could meet and express their views and pass resolutions for the attention of our National Congress.

It has been clearly proven in recent years that what is now known as the International Irrigation Congress has outlived its usefulness and is in fact merely an avenue whereby a few of the favored ones may go out to meet the pay wagon.

The last few meetings of this body have been a source of amusement to the men who organized and were active in the work of the Irrigation Congress of past years.

The object to be attained under the new plan is primarily to give settlers on the various projects an opportunity to air their views and open a discussion which will result in resolutions being put through that will attract the attention of the authorities in Washington and result in reforms for which the ordinary settlers have been clamoring since the passage of the Reclamation Act.

It was the opinion of many that the Irrigation Congress would fill this need, but it soon became apparent that outside influences were at work to thwart this plan and eventually the Reclamation Service and its henchmen were in full control and the settler who attended with the idea of registering a complaint was quickly sidetracked or altogether ignored. This condition has been somewhat modified under the Lane régime, but is not yet entirely eliminated, hence, the need and demand for a congress where the settler may tell his troubles with some likelihood of being given proper attention and assistance.

A prominent western city, centrally located, has offered through its Chamber of Commerce to assist in the formation of this congress and stand under any expense for halls, publicity and entertainment, provided the congress is held permanently in that city.

Owing to its central location and unusual railway facilities, this offer will no doubt be accepted by the new organization.

More full details will be given in future issues of THE IRRIGATION AGE.

#### **Government Should Control Water Power**

From the Portland, Oregon, Telegram, May 21, it is learned that Engineer Louis W. Whiting has filed a report on the Buck Lake irrigation and power project for one J. J. Chambers, of Ashland, Oregon. This report informs us that Buck Lake covers about 4 square miles, is situated near the divide of Jackson and Klamath counties and has an elevation of 5,000 feet. The lake has a mountainous watershed of between 80 and 100 square miles and its discharge in the dry season is given as 60 second feet.

It is estimated that a dam across the outlet of the lake will raise the water 46 feet, yielding a storage of 115,000 acre feet, enough to irrigate 46,000 acres.

Continuing, Mr. Whiting presents the following figures, which should be interesting to Gifford Pinchot, Homer Reed and hundreds of other think-

ers who are trying to prevent the people from being deprived of their rights by grasping money kings. Mr. Whiting has in his report exposed the real objection to giving rights of this character to any individual or corporation.

He states:

"It is estimated that 18,000 horsepower can be developed. The sale of part of horsepower would bring \$500,000 per year. The irrigation of 10,000 acres at \$40 an acre, together with \$1.50 net annual maintenance cost, would yield \$530,000. The total cost of installation, including a power plant, is \$765,000. It is proposed to cover that with a bond of \$1,000,000. The net annual income from this plant is estimated at \$300,000."

The foregoing is a fairly good illustration why either the state or Federal Government should interfere and save this great income for the people so that it could be applied to work that would develop other resources of the state, the income from which could be used for the benefit of the public and not turned over bodily to individuals or corporations.

THE AGE has not always agreed with the policies of Gifford Pinchot nor his friends, but he is right in his present fight and should be supported by all right-thinking people.

#### **NEW IRRIGATION LAW PREVENTS "WILD-CATTING"**

##### **Arizona Adopts Statute Which Will Remedy Many Irrigation Evils**

We have read with a great deal of pleasure an account written by Prof. Smith, irrigation engineer of the Agricultural Experiment Station of Arizona, in which he tells of the proposed irrigation law for this state. From the account, it would seem to us that this law embodies all that is good in the irrigation laws of most of the western states and leaves out that which is bad. The bill provides for a state water board. This board is made up of the governor, state engineer and the corporation commission. It will be the duty of this state water board to fix the priorities of the present ditches and all new appropriators must make application for a permit from this board to divert a certain amount of water. The state engineer's office will have or obtain data concerning the unappropriated water in that particular stream. If there is unappropriated water there, the permit will be granted, if not, it will be refused, or will be granted on condition that the applicants build a reservoir and store the flood water. If this water commission rightly handles the problem, it will protect the water users as well as prevent the "wild cat" irrigation schemes that have been so detrimental to some of the other western states. It seems to us that Arizona is on the right track and if she can pass the law as proposed, she will relieve herself of much litigation in the future.—E. B. House, Colorado Agricultural College, Fort Collins, Colo.



## GIFTS OF LAND AND WATER POWER

HOMER REED POINTS OUT NEW MOVES TO STEAL NATURAL WEALTH, IN COMMUNICATION TO KANSAS CITY STAR

The magnificent fight led by Pinchot and his associates saved the Alaskan coal fields, at least temporarily, from the Guggenheims. It led also to the adoption of a general public land conservation policy by Congress, which was supposed to be permanent. However, the game of robbing the people of the United States of their natural wealth for the last fifty years has been so easy,

so fascinating and so lucrative that the operators evidently have only been lying low for Pinchot and conservation to drop a little out of the public mind before they attempted other raids on Uncle Sam's natural resources.

These plunderings always come in the guise of "developing our resources" or to pay for some bewhiskered claim for public highways or for educational purposes. The essence of the game is always the same. A grant to a state, a state lobby to order the lands transferred for the building of a road or a school building, or a sale for cash under such conditions that only the money combination promoting the scheme has a chance to buy at a fraction of their real value. Then the lands are retailed, like the Texas school lands, at an immense profit and the people of the state get a trifling benefit and the promoters and manipulators make handsome profits and Uncle Sam for the dear people gets nothing.

The present raid is as follows: Senate Bill No. 2520 was introduced by Senator Key Pittman of Nevada, on December 16, 1915. It was reported out of committee the next day. The bill grants seven million acres of public lands to the Nevada legislature for the benefit of public schools and the state university.

Up to date thirteen other bills calling for free grants of lands to the various states have been introduced and referred to the public lands committee, in all proposing to give away thirty million acres of the public domain. Of these, one introduced by Senator Smoot of Utah is unique. It proposes to give to Utah one million acres of public land in compensation for expenses incurred in suppressing Indian disturbances of 1865 to 1868, the selection to be made "from any lands that belong to the United States government within such state, whether such



An Inexhaustible Supply.

lands be within or without reserves." The little impediment of a "forest reserve" which had been worked out at great labor and expense by the government was not to be considered, as those fine timber lands were just what they most needed.

Senate Bill No. 732, introduced by Senator Warren of Wyoming, provides for a gift of one million acres each to the states of Arizona, Colo-

rado, Idaho, Montana, New Mexico, Nevada, Utah and Wyoming, the proceeds to be used in the repair and maintenance of public roads. Senate Bill No. 897, introduced by Senator Pittman, asks for a gift of two million acres to Nevada, the proceeds to go to public schools. Senate Bill No. 1215, introduced by Senator Shafroth of Colorado, asks a gift of one million acres to be "selected by the governor from any lands that belong to the United States within such state, whether such lands be within or without the forest reserves."

It will be also noticed that no mineral, forest or other rights are saved to the United States.

This is a sample of the plundering policies of Congress for the past fifty years. It gives away millions of acres of land and billions of dollars' worth of oil, coal, iron and lumber, but at the same time, to pay the running expenses of the government, taxes babies' cotton shirts and stockings and little girls' hair-ribbons, and the sugar that every man, woman and child must use as food regardless as to whether their earnings are \$3 per week or \$3 per day.

Look at that monumental thievery by which a prominent Westery railway company, through grants fraudulently obtained, got possession of 160,000 acres of oil lands in Southern California, which the United States is trying now to regain in the courts. This 160,000 acres of land is now valued at one billion dollars, equal to the national debt. It is of such staggering values as these that the people of the United States have been robbed. The Hill group of iron mines in the Lake Superior district are valued at 400 million dollars, for which the United States received a few thousand dollars at \$1.25 per acre.

The Democratic platform of 1912 has a con-

(Continued on next page)



## MAGNIFICENT EXHIBIT—NORTHERN PACIFIC RY.

The Northern Pacific Railway has installed in its new general office building, Fifth and Robert streets, St. Paul, in connection with the Immigration Department, a large and most complete exhibit of the various products of the territory tributary to its lines, from the Great Lakes to the Pacific Ocean. Every state and county, and almost every neighborhood, is represented.



Three Years From the Desert.

The exhibit is decidedly educational, on account of its comprehensive character. It would be an inspiration to the best boosters of the Northwest to visit this wonderful display. There are over 1,400 separate articles on exhibition, including about 700 bundles of grain and grasses, about 400 jars of processed fruit, vegetables, flowers, fish, oysters, clams, crabs, berries and eggs of different kinds; nearly 100 pictures, transparencies, etc., and over 100 exhibits of fresh fruit, vegetables and miscellaneous articles.

In the grain display there are splendid specimens of different varieties of corn from all the states, Wisconsin to Oregon, besides several specimens of rye, oats, alfalfa, timothy and soudan grass, from six to eight feet tall, and alsike and red clover nearly six

feet tall. Among the jars of processed fruit and vegetables are apples and onions weighing about 1½ pounds each, potatoes weighing about 5 pounds each, and a jar of kelp from Bellingham Bay. This kelp is a sort of vegetable animal, and is one of the most unique exhibits in the collection. Potash is being made from this kelp.

There are several jars of roses, in which the rose,

leaves and stem are all preserved in their natural colors and beauty. Also peonies, dahlias, snowdrops, daisies, syringias, larkspur, sweet peas, spirea, etc.

In the picture section there are several paintings, 9x11, 9x16 and 9x20 feet, representing farm scenes in all the states tributary to the Northern Pacific.

It is worth a trip to St. Paul to see the products of the entire Northwest which are shown in this exhibit; and anyone visiting St. Paul will miss a treat if he fails to spend at least a couple of hours in this free exhibit of the Northern Pacific. It has taken months of patient work and considerable expense to assemble this rare collection.

### GIFTS OF LAND AND WATER POWER

(Continued from preceding page)

servation plank in it worded so that Congress can go ahead and plunder the public domain. It meant nothing. Was not intended to mean anything. Was specious and deceptive. The Republican platform also has a conservation plank, full of holes. The Progressive platform also had a leaky plank on conservation. The Prohibition platform came nearer saying something than all the others when it urged that "all mineral and timber lands and water powers be held in perpetuity by the government and leased for revenue purposes."

The trouble was that all politicians wanted conservation that did not conserve. Every platform left everything to Congress, so it could conserve this year and squander and plunder next year. If they had wanted to conserve they would have demanded a constitutional amendment which should forever make it impossible for the United States to part with the ownership of an acre of agricultural, mineral or timber lands or a water right, and restrict leases on proper royalties to one generation—

thirty-three years. In fifty years the rents and royalties would make it unnecessary to tax babies' stockings and shirts to raise money to run the government.

Any member of Congress who votes for any one of the land gift bills above mentioned is a public enemy.

### RUSSIA STUDIES U. S. IRRIGATION

The Russian government has been making a study of the Uncompahgre valley reclamation project through its representative, P. P. Von Weymann, deputy of the imperial Russian minister. In many parts of Russia climatic and topographical conditions are very similar to those which exist in the western states, particularly in Wyoming, Colorado and Nebraska. Indeed, so much do these sections resemble each other that the United States government has been making experiments with different kinds of alfalfa that thrives in Siberia with the purpose in view of introducing these varieties into this country. Similar experiments have been made with several varieties of Russian apples.



# RECLAMATION FROM THE VIEWPOINT OF THE SETTLER

By Edward Gillette, Chairman Board of Review, Northern Division.

The cultivation of new land so as to bring it to a high state of production has been the great work of our people from the time of the first settlers on our eastern shores up to the present time, and will continue so to be for many generations to come.

The privations and work of all these settlers have been much the same. The first settlers had to provide shelter and prepare the land for crops, and until a harvest was made game in the forest and sea food constituted their living. The settler of today is doing the same thing over again. The operation is taking place in the interior remote from sea food; a few fish in the streams and jack rabbits on the plains are the means of existence for many a pioneer until his land is made to produce a crop. Upon a close investigation it would be difficult to determine whether the first or the present settlers have endured the greater hardship. The earliest settlers banded together and helped each other; in union there was preservation. Today it is everyone for himself, except in Mormon colonies, where the welfare of each member is looked after as far as necessities go, and helping each other is a principle to be thoroughly carried out. This is the cause of the Mormons being uniformly successful as pioneers.

Many a settler on our treeless arid and alkali plains with a rude mud hut for shelter, a crude fireplace where corn cakes are baked on stones, has been happy in the possession of a box of cartridges with which he could procure a few rabbits; even the bad alkali water does not discourage him. Compare this with the good water, trees with which to build cabins, game and sea food available for the first settlers of the country, and we conclude that the hardy pioneers of the present day would have survived the ordeal of developing a new country better than our Pilgrim Fathers who had little experience in this work. Our western settler loves the bright sunshine and invigorating air of our arid plains; to him the wet weather, gloomy skies and lack of vigor in the atmosphere of the eastern country is very depressing. It is fortunate that people as a rule become attached to Mother Earth wherever fate has cast their lot.

Some of this work of development is being performed through a bureau of the Interior Department, designated as the U. S. Reclamation Service. The hardships, privations and necessities of the settlers on these projects in order to make farms productive enough to support a family, are little understood by the government, and it does not know or realize fully the deplorable conditions existing or what is necessary to eliminate them. Opinions by learned expert irrigationists do not give results desired; these can only be obtained by

a thorough consultation with the settlers themselves and an intimate knowledge of their condition. In no other way can this problem be solved in a right manner. The watchword must be eternal investigation for the greater success.

Three classes of farmers go west: the comparatively wealthy farmer who always buys a farm more or less improved; the second, who has from a few hundred to a few thousand dollars; and the third with practically nothing, who simply files a homestead on the public land. Reclamation projects are settled by the second class.

The Reclamation Service was organized more in reference to what kind of a bill Congress would pass, deferring to the demands of eastern congressmen and senators, rather than the practicable settlement of the lands required. Accepting this as a fact and considering the scant knowledge of irrigation possessed at that time by those in power, the results obtained to date are better than could have been reasonably expected.

The value of irrigation is so great and important to our country that deference to eastern opinion as to the provisions of its organization were no doubt justified, in order that the government should take up this business; the quicker the better, for this question can be solved in no other way. In other words, it is a national question, not a local one. The reclamation service has apparently made a mistake in not making a ruling point of the proposition that the success of its settlers is the proper gauge by which to measure its own success. It has been too well satisfied with the publicity and praise given its construction work and what benefits future generations would derive from the same and neglecting the success of its pioneer farmers, the main spring of the works.

The funds to carry on this work were to come from the sale of public lands and were to be expended according to the amount received in each state. The result of this provision was that in one state supplying the greatest revenue, little or no irrigation was practicable. The service went over this territory, as one expressed it, "with a fine tooth comb to discover an irrigation project." Two projects were finally selected, one involving a pumping plant and being more than less experimental, the other for the greater part being in an adjoining state. This latter, located in a semi-arid region, was already settled to a great extent by well to do farmers whom the service officials finally persuaded to mortgage their farms and improvements for the project, on the ground that their business would be benefited thereby and under no circumstances could or

would the cost exceed a certain price per acre. Under these circumstances, as distinctly understood and expressed by both parties to the contract as possible, the farmers mortgaged their property to the government.

Before this project was completed, it was found out that the cost would be more than double that given the farmers and would wipe out all their interest in the land and improvements, if collection of costs was attempted. It killed all idea of their being able to borrow a dollar on their farms from any source. As regards the pumping plant, three times the total value of the improved farms under this project would have to be collected in order to return the full cost. It is simply childish under these circumstances for anyone to talk about returning the full cost to the government, as it does not exist.

It is extremely doubtful, in a court of equity, if the government could make its case good and confiscate the lands and improvements of the farmers involved, and, what would be the result if it did? The government could not dispose of this property to anyone for more than its value, but would simply be placed in a worse condition. Delay means waste. The only sensible or right thing for the government to do under these circumstances is to make a reasonable building charge for what the land will stand; *by all means keep faith with the farmers as regards promises made*, wipe out the absolutely unrecoverable loss, and do business as any other concern would have to do under the circumstances and save further loss. To allow present conditions to continue is reprehensible; that which has passed has much to atone for of a mitigating nature.

The Board of Army Engineers appointed some five or six years ago by the government to investigate its irrigation projects reported that "there would be a considerable loss to the reclamation fund" from both these projects.

The cost of irrigation works in the West comes nearer being uniform than the value of water to the land; in some cases the water has increased the value of the land several times the cost, but the government gets back nothing beyond the bare cost; in cases where the cost of the works exceed the added value of the land, there is no remedy, and the government is in the position of trying to get something for nothing in collecting this excessive cost. A private concern would have made a reasonable profit on the water where such could have been made and thus provided for a loss where the cost would not be collected. To not do this was in one case to throw away all the profit, as a rule to speculators,



and in the other to fasten a loss on itself which it was impossible to shoulder upon the poor farmer.

Settlers on reclamation projects have felt for some time that overhead charges were more than they could stand. There was an irresistible tendency to build up each project office with a corp of engineers, draftsmen, fiscal agents, etc., so as to make each project as complete as a general office should be. As an example, Mr. Williamson, who has charge of the central office at Denver, directing construction work, recently did away with fiscal agents on the various projects, concentrating this work in Denver, thus reducing the cost per year from \$80,000 to \$6,000, a saving in this item alone of \$74,000 per year to the farmers. Larger savings than this are being made in other items, and it is thought that by adopting standard plans for many of the smaller structures, better work will be secured at a fraction of the present expense. This is great work, necessary and fine; the farmers are entitled to what this kind of administration promises, but it does not reach the heart of the problem.

According to data secured by the reclamation service and boards of review in the northern division, it costs the farmer for buildings, fences, breaking up and leveling the land, laterals and some farming machinery, \$60 per acre, to which must be added the cost of livestock and water. In order to pay for these expenses and make a living for his family, the farmer must get within reasonable limits all that the land will produce.

The most profitable business for ninety per cent of our farmers is livestock and dairying. In this way he gets the highest price possible for the feed he raises and the livestock keeps up the fertility of the soil. We should devote all possible efforts towards establishing the farmer in the stock business. Ideal conditions exist where the farmer has a summer pasture above the canal for his surplus stock, and feeds them at home during the winter on his irrigated land. The government can assist more than others in bringing about these ideal conditions. Expert advisers should be furnished by the Agricultural Department and a reasonable amount of money loaned the farmer at four or five per cent until he gets on his feet and makes a living for his family.

When one stops to consider the enormous initial expense to the settler in getting started, the wonder is that any succeed, under existing conditions. If a farmer has enough means to buy a farm, he never attempts to make one; that is too costly and arduous a task, besides taking too much time. It is plain to be seen that the settler on our irrigation projects as a rule has little money, as otherwise it would pay him better to buy an improved farm; even then the effort to put the place on a paying basis is no small one, requiring much time, labor and money. Conditions are such on most of our reclamation projects that only a foreigner with a large family, used to the plainest living and disregarding the education of his children, can be successful. These

conditions should be changed so that an American family can succeed. Our settlers need help in order that they may be successful and as a business proposition be able to pay to the government the cost of furnishing water for their land.

Of what importance is irrigation to this country? There is enough unused land and water now going to waste in our arid regions which, if utilized, would support our entire population at present. It costs fifteen millions for a first-class battleship, and we are in favor of this expense even if the ship goes to the junk pile in ten years. The same amount of money expended on irrigation works would be returned to the country every few years, over and over again without limit, besides furnishing homes for our dense eastern population, benefiting the whole country, and increasing our best class of citizens, engaged in the most essential occupation for the well being and growth of our country. To put this irrigation business on its feet at the present time—and it sorely needs help—is no doubt our greatest duty and privilege. It will benefit the whole country more now and in the future than is possible by the expenditure of money in any other manner.

I believe that the policy to be adopted in regard to government reclamation projects can only be determined by a most thorough investigation of the subject by a board of irrigation experts. The belief the settlers have, that the reclamation service does not understand or properly consider their condition seems justified, and the view that the settlers are striving mainly to get something for nothing is superficial, and does not represent the facts in the case. Neither the settlers nor the civil engineers are expert irrigationists; even if they were, conditions would have to be materially changed in order to obtain desired success.

On taking up work for the Board of Review on the Northern Division the reclamation service members believed, as a rule, that all the data necessary to make a report was to be obtained in the project manager's office. This was true so far as engineering features, costs and results obtained were concerned, such as crops grown, their yield, and the amount received for same. It was thought proper, however, to give the settlers an opportunity to make any statements desired, and a letter was sent each settler on a project, inviting him to come before the Board, between certain dates, and present his ideas, or to send a letter expressing them, so that the Board might have the benefit of his knowledge regarding conditions looking to improvements of the service and correction of errors. Many settlers responded to this invitation in a very satisfactory manner. It appeared, however, that a majority of the settlers did not wish to come before the Board and fewer still responded by letter.

We found, however, that all the settlers were ready to give their views and answer our questions when visited in their homes. We asked them,

among other questions, the number of years they had been on the project, size of family, location of farm, number of acres, crops raised, yield, disposition of same, improvement made and cost, how much money they had at the start, present financial condition, including deposit at banks, amount owing to banks, individuals and stores, on and off the project. We assured them that the information would be regarded strictly confidential and that it was obtained for the purpose of arriving at facts in order that we might be aided in making an intelligent and proper report.

To illustrate how opinions change from getting a different point of view, one settler who had given his testimony and then remained listening to the testimony of possibly a dozen other farmers, remarked, "I think now just the opposite of what I did when I came in here." A project manager who had seen many years in the service, remarked that "the testimony of these settlers has given me an entirely different view of their condition and of the project." When people vitally concerned and living on a project change their views so quickly, what can be said of those who have only a smattering idea of the subject?

We found the settlers on projects in the northern division highly intelligent, sober, and industrious, averaging better in these respects and having more money to start work with than the ordinary settler. Some of these had brought as high as six or seven thousand dollars to the project; some were graduates of agricultural colleges and came from eastern, southern and western states. They impressed one as having better than average intelligence, comparing favorably with that exhibited by the government officials on the project.

As a rule, reclamation service employees appeared to need a term of three to five years service in pioneer work trying to make a productive farm out of a vacant raw piece of land. This experience certainly would open their eyes to the human or sympathetic side of the proposition as nothing else could do. The next best thing, however, and much easier would be for them to get in touch with each settler and learn first hand of his troubles, failures, and successes.

It has been the unanimous opinion of all who have done this that it would be no mistake to aid the settler in any reasonable way. He is not only entitled to this consideration for the good he is doing, but as a business proposition any effort to help him will benefit the country at large many times the aid extended.

Let it be understood that the term aid is not used here in the sense of making the settler a present—as a rule, he neither expects nor desires it. What he does want is to have a price for his farm reasonable as compared with those in the vicinity constructed by private capital. If the land becomes water-logged and alkali, it is a community proposition and requires drainage. This is unfortunate and would cause the abandonment of the entire project if not corrected; drainage is an absolute necessity; help



must be afforded, and the farmer is willing to pay for it, when able to do so. Where lands under a project will not yield a crop, having always been devoid of vegetation, the government should reserve these sections, turn them over to the Agricultural Department until they have been brought to a state where they are capable of producing crops before being assigned to settlers. There are gumbo lands on the Huntley Project in Montana where the settler, after years of trial, has not been able to grow a crop equal to the seed sown.

At the start the settler has but a small part of the money necessary for improvements and to commence paying for water. It is clearly to be seen that whatever costs there may be must come from the soil; success, therefore, absolutely depends upon what the land is made to produce. What the farmer wants and must have as soon as possible is a productive farm, so he can live and pay expenses. This is the main thing, beside which the cost of the project, while very important to him, is a secondary consideration.

The government is simply expected to afford such help as it reasonably can, commensurate with its own interest, and with due regard to the importance of the agricultural and stock raising business to the country at large. The engineers on the reclamation service are not farmers, and should not have the direction of this work placed upon them. It is the work of the Agricultural Department and should be so assigned. The construction department of the reclamation service can take care of the civil engineering required after the project has been opened for settlement. The chances are that a good agriculturist or farmer would make a poor civil engineer and vice versa. The civilization of the present time demands the services of the best experts in every class of business, more each year; when this principle is put in effect on our reclamation projects, the desired success will be achieved and not until this is done.

The necessity of something being done now is apparent when it is understood that four out of five of our reclamation projects would, if owned by private capital, be in the hands of the receiver today, with the probability that those putting their money in this business would never get a dollar back. Not only is the reorganization for economy in construction necessary, which is now being put in effect, but the agricultural part of this business must be put on its feet and take precedence over all other work until it is properly organized.

Members of Congress, individually, will find it impossible to acquire the knowledge to vote intelligently upon this matter; it is a question for agricultural irrigation experts to solve just as much as it is necessary to have civil engineers on works requiring engineering talent.

It is not the purpose of this article to discourage irrigation, but just the reverse. Irrigation is bound to increase as sure as our population grows. Ultimately, irrigation must be conducted in such a manner as to

produce necessary results. We have the means, the land, and the knowledge required; to assemble and put these forces to work properly is the problem which has to be solved in order to avoid great waste of natural resources and unlimited hardships to the settler on our irrigation projects.

Now is the critical period for the settler and the Reclamation Service. If proper relief is not accorded the pioneer settler his fate is sealed; he must go, a sacrifice to the government's method of handling these reclamation projects. The great majority of eastern over western congressmen almost precludes the possibility of western natural resources being developed in a proper manner. If the pioneer settler is forced to the wall, it would have been much better had the project never been undertaken. By far the greatest resource we have is the settler, and if he cannot be properly conserved, the quicker the government gives up trying to conserve western natural resources the better, for it is pretty certain to do more harm than good.

As far as the law goes reclamation service officials are paid by the settler, whom they have not represented in any efficient or proper manner, as their ultimate paymaster. The main idea has been to get appropriations for new work and the welfare of the pioneer settlers has been almost entirely neglected. The time has arrived when this general condition of affairs on most of our reclamation projects must cease or the Reclamation Service itself be discontinued as being utterly incompetent to handle properly the business it has attempted to perform. It must be borne in mind that the present struggle is a matter of life or death financially to a majority of the pioneer settlers on our reclamation projects; they, being, as a rule, native born Americans, are not going to be sacrificed without making a struggle characteristic of their nationality.

## LETTERS FROM WATER USERS

### A "Gentle" Roast

TO THE IRRIGATION AGE: In your issue of January, 1916, page 36, "About Cost Review Reports," you say "There is no doubt but that all these reports are drastic in their declarations and recommendations."

As to our Shoshone project, this is a wild shot for THE IRRIGATION AGE to take. It would be more expected from a publication much less relied upon for correct and sane statements. In the face of the best authority in Wyoming, and with due regard to the price of contiguous irrigated lands in operation for ten years suggesting that the Shoshone water rights was worth only \$30.00, by way of compromise to satisfy the government's special representative on the board and secure an unanimous report and end, if possible, contention and uncertainty, upon the project, 50 per cent was added, making the price \$45.00 per acre. The good name of

THE IRRIGATION AGE would certainly prosper in a correction of your statement. Your source of information no doubt had its origin in the Washington Reclamation office, whose management seem to be fighting "pussy footed" for their official lives, without realizing that their interests would be best served by a proper adjustment at this time. Should the local board report not be sustained, it is the intention to begin a campaign for a \$30.00 price. In this, with some notable exceptions, we believe the state will join. The U. S. has no right to use its prestige to fool and then its power to crush its pioneer reclamation settlers. D. L. Heaston,

A Settler,

Powell, Wyo.

### TO THE IRRIGATION AGE:

A recent copy of your interesting publication came to my notice. I read with especial interest the article by Mr. Mead. It is to be hoped that the agitation for more adequate financing of farm enterprises will result in accomplishing the purpose. Quite likely the rural credit or farm loan law will be passed by this Congress. It has occurred to me that unless an effort is put forth to prevent it, farmers under government projects will find it impossible to secure loans under this law. In Oregon the state school funds are loaned on farm properties at 6 per cent interest. But farmers on the projects are unable to secure such loans because the state authorities hold that the water right contract is a first lien or mortgage, and the state will accept only first liens.

Now will not the officials administering the farm loan law hold the same? Will they not refuse to place loans in projects where the Reclamation Service holds first liens to secure unpaid water rights?

This seems to me to be of great importance. It will be a sad blow to irrigation farmers if they can not secure loans under this law.

I suggest that water users associations in the various projects urge their representatives to look after this point. May I not urge that you take this matter up through your paper?

J. G. Swan,  
Klamath Project.

Merrill, Ore.,

The Southern Lassen Irrigation District now is a legal body. Its formation has been approved at the polls and its officers have been elected. The district includes 22,500 acres and the cost of bringing water to the land will be between \$33 and \$35 per acre.

If you want to keep in touch with all sides of the Reclamation Problem send \$1.00 for one year's subscription to the Irrigation Age, 30 North Dearborn street, Chicago.

# TURN-OUT BOX WITH WEIR

WITH  
ILLUSTRATIONS

The accompanying illustrations show methods for taking water from the main flume or pipe line for the purpose of measurement by means of weirs.

Fig. 1.—Weir measuring box with turn-out from open flume. This arrangement is extensively used and well adapted for fairly correct water measurement. The wooden gate shown in the flume is

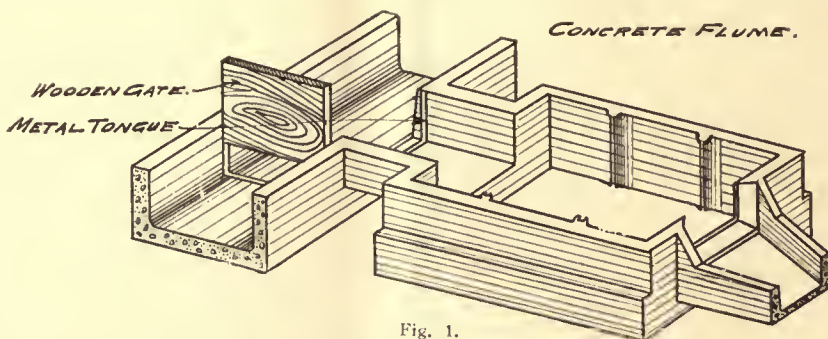


Fig. 1.

Fig. 2 and Fig. 3 show methods for taking off water from pipe distributing lines. An open wooden or concrete box is used, fitted with a weir or a miner's inch plate for measuring the amount of water

passing to the irrigator. A sliding gate or an adjustable valve is used for taking off the proper quan-

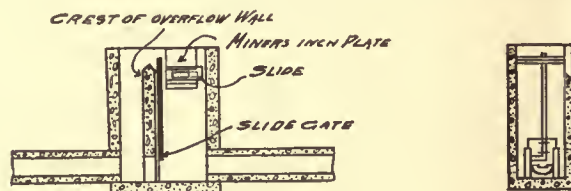


Fig. 2.

partially closed so as to direct the proper amount of water over the weir in the measuring box to the irrigator.

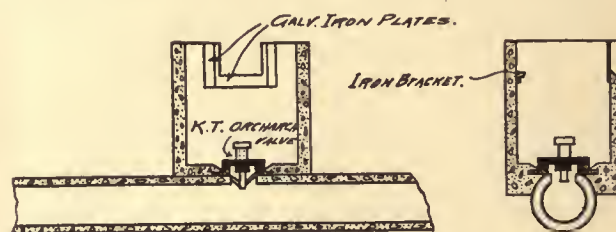


Fig. 3.

tity from the main supply flowing through the pipe line.

## YOUR WOOD LOT? IT'S MONEY, FUEL, FERTILIZER

EVERY farmer needs fuel; every farmer needs fertilizer; and every farm woodlot needs improvement. Why not kill all three birds with one stone? By judiciously planned thinnings the condition of the woodlot can be greatly improved; the material removed in the thinnings can be burned as firewood, and the wood ashes left are so rich in potash as to make a valuable fertilizer.

The woodlot is, perhaps, the only farm crop to which the farmer has not considered it necessary to devote any care. His grains are sowed on carefully prepared soil; his vegetables are cultivated, and his fruit trees are pruned and sprayed; his forest trees alone are left to look out for themselves. This is the more remarkable when it is taken into consideration that any labor expended on the woodlot not only improves the final crop, but ordinarily pays for itself as well. No detailed technical knowledge is required for the work, all that is necessary is the exercise of common sense.

It is obvious that the trees in any woodlot are not all of equal value. Some are taller, straighter, thriftier, and of species which yield more valuable wood than others. It is also obvious that there is a constant struggle going on between the trees for light and growing space. The object of thinning is simply to give the best trees the advantage in this struggle by removing the poorer ones which interfere with their development.

First of all, defective trees should be removed.

This includes trees attacked by insects or fungi (conks), trees with fire-scarred butts, with tops broken off by wind or lightning, and in general all trees which are unthrifty from any cause. Next come the trees of poor form, such as very crooked or very branchy ones, which are interfering with the growth of better formed neighbors. And finally are the trees of less valuable species, such as dogwood, ironwood, and hornbeam. These not only take up space that might better be occupied by such species as oak, hickory and ash, but also, as a rule, produce seed more abundantly and so reproduce themselves at the expense of more desirable trees.

While the wood removed in these thinnings is frequently of no value for other purposes, it can practically always be used to advantage for fuel. In this way the work can be made to pay for itself, particularly when the future use of the wood ashes for fertilizer is borne in mind. The essential point to remember in making such thinnings is that the woodlot is a tree society, in which the best trees should be given every chance to attain the greatest possible development by the removal and utilization of the unfit.

**SEND \$1.00 FOR THE IRRIGATION AGE ONE YEAR AND THE PRIMER OF IRRIGATION.**



## DISPLACEMENT OF HORSES BY TRACTORS

In investigating the value of the tractor from the farmer's point of view, specialists of the Department of Agriculture recently obtained from over 400 owners of tractors in Illinois reports as to the number of horses which the tractor had enabled them to do away with in the farm work. The following analysis of about 200 reports from typical corn-belt farms is taken from Farmers' Bulletin 719, "An Economic Study of the Farm Tractor in the Corn Belt."

"Many men look to the tractor to enable them to do away with the use of horses for farm work, at least in great part. To date, however, the tractor has not displaced horses to the extent commonly expected by purchasers, but its greatest advantage, as before mentioned, lies in the fact that it does the heavy work quickly, and thus completes it within the proper season, since it places at the farmer's command a large amount of power when needed.

"The tractor does displace horses to some extent, but only in about two-thirds of the cases where it is used on the same number of acres previously farmed. In these instances the horses displaced average only about four, and represent slightly less than 50 per cent of the cost of the tractor outfit. The number of horses displaced does not appear to vary to any great extent with the size of the outfit, about as many horses being laid off after the purchase of a small outfit as after buying a large one. The number will vary under different conditions, however, the principal influencing factors being the number of acres farmed per horse and the distribution of the work throughout the year. In the corn belt horses are seldom displaced on farms where the average tilled acreage per horse is 30 or more. On the farms in Illinois where horses were displaced by the tractor one horse had been kept for each 20 acres of tilled land. After the purchase of the tractor one horse was kept for each 30 acres of tilled land, or approximately the same as on farms on which no horses were displaced.

"There is much work on most farms for which it is neither practicable nor profitable to use the tractor. This is especially true in the corn-belt section, where cultivating frequently requires more power at one time than any other farm operation. Few, if any, tractors, according to reports received, are utilized for such work with entire satisfaction, and it is, therefore, necessary to retain a considerable number of horses after the tractor is bought.

"A study of the distribution of horse labor on a typical corn-belt farm indicates that the peak load, that is, the greatest amount of work, comes about the end of May, which is the season when corn cultivating is at its height.

"On 92 Illinois farms where no change in the

acreage was made after the purchase of the tractor an average of 12 horses per farm had previously been kept. Two hundred and sixty-three horses were displaced on these farms, an average of not quite three horses per farm. On 31, or about one-third, of these farms, no horses were laid off.

"The raising of colts is an industry of considerable importance on farms in the corn belt, and it would seem natural to expect that where tractors were bought and the work stock thus relieved of the heavy field work the percentage of brood mares kept would be increased, and that the chances of raising more and healthier colts would be enhanced. It was found, however, that on a large group of farms in Illinois the brood mares constituted 33 per cent of the work stock before the tractors were bought, and while the work stock was decreased to some extent after the purchase of the tractor, the percentage of brood mares increased only 3 per cent, making the percentage now kept amount to 36 per cent."

## FOR ALASKA HOMESTEADERS

### New Government Circular Giving Useful Information to Prospective Settlers in the Territory

A circular for the use of those who are thinking of settling in Alaska has just been issued by the Department of Agriculture as Circular No. 1 of the Alaska Experiment Stations, under the title of "Information for Prospective Settlers in Alaska." This circular is designed to answer questions as to the climate and agricultural areas of Alaska, the best places to locate, the ways of obtaining a farm, the means and cost of transportation, cost of living, what crops can be grown, possibilities of live stock production, labor conditions, school facilities, game laws, etc., etc. The publication is intended primarily for the benefit of homesteaders. It is stated that the agricultural area of Alaska (mainly in the interior valleys) is as large as the combined areas of the States of Pennsylvania, Maryland, Delaware, New Jersey, Connecticut, Massachusetts, Vermont, and New Hampshire, and it should be capable of supporting a population nearly equal to that supported by the agricultural products of those states.

The circular contains a special report on the agricultural possibilities of the valley of the Matanuska river, through which the government railroad is now being constructed and where, as a result, settlement has recently been rapid. The great problem here, as elsewhere in Alaska, is the clearing of the generally heavily wooded land. The soil and climate have been found favorable to general farming, the experience of the past few years having shown that a considerable variety of field crops, vegetables, and fruits can be produced.



## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### Arizona

Restoration of approximately 400,000 acres of land lying along the Little Colorado river to settlement and entry, says the Phoenix (Ariz.) Gazette, indicates that the government has abandoned the proposed Little Colorado river irrigation project. This land was withdrawn from entry under an order issued Nov. 19, 1904, under the same form of withdrawal as the Salt river project. This land, it is stated, will be open for settlement on June 26 and for filing and entry 30 days later.

A crop which may prove very important to the dry farmers is being carefully watched at the Cochise Dry Farms Experiment Station in the Sulphur Springs valley. It is the Canadian field pea, which was planted in February and will be ready to harvest the last of May.

It is not generally believed that corn can be profitably grown in the hot irrigated portions of Arizona. However, yields of as high as 125 bushels per acre are reported and adapted varieties have been bred which under conditions of great heat easily yield 75 or more bushels per acre. The Agricultural Extension Service of the University of Arizona, in co-operation with the Arizona Bankers Association, has arranged a state-wide farmers' contest to demonstrate what may be done in different counties of that state.

### California

The question of the organization of an irrigation district in Thermalito and the election of directors has been fixed by the board of supervisors at Oroville for June 14.

A committee representing the Kings River Water Control and Conservation district met recently at Fresno. This committee has been working for two years shaping up a plan for legislative aid for the irrigation districts of central California. There seems to be a fight on as to what site will be accepted for a dam on Kings river.

Petitions have recently been circulated in Lindsay asking the board of directors of the Lindsay-Strathmore irrigation district to call a special election to vote bonds in the sum of \$1,400,000 for development of a water system to irrigate 15,775 acres of land lying along the foothills south of Exeter. The estimated cost is on the basis of about \$85 per acre. Practically all of the land it is proposed to cover is citrus land of a high quality.

Word comes from El Centro of scientific research work with a view to solving the silt problem in the Imperial valley, and a recent conference of directors of the Imperial Irrigation

District, mutual water companies and water users resulted in a resolution being unanimously adopted urging the work to be undertaken immediately. The main purpose of the plan is to provide an effective means of placing the rich silt from the Colorado river on the farming land and preventing its deposit on the irrigation canal banks.

The organization of a state irrigation board was completed recently. It is a non-salaried body with no appropriation and will only have jurisdiction over irrigation districts that are formed in the future. A. E. Chandler, of San Francisco, was named chairman of the commission. Assemblyman Edgar L. Sisson, of Red Bluff, was elected secretary. It is probable that an application for the formation of a \$200,000 irrigation district in the Tulare lake will be acted upon at once. There is also an application before the commission for the formation of a district of 200,000 acres in Tehama county.

Word comes from Oakdale that the Cape Horn tunnel, which will furnish water to 10,000 acres of land in the Oakdale irrigation district, was completed recently. This work cost \$58,000. The tunnel is about a mile and a half long.

A Redding (Shasta Co.) letter states that according to report of Roscoe J. Anderson and W. B. Mason, the committee on irrigation named by the directors of the Northern Counties association, there are 200,000 acres of land in Lassen and Modoc counties for which irrigation projects are feasible.

The construction of the Anderson-Cottonwood irrigation system will cost more than was estimated. The total cost of the construction of the system has not been absolutely determined, but it is feared that it will go above the amount which the district is permitted to spend on it, namely, \$450,000, which is the amount of bonds voted on and sold.

An attempt will be made to store 250,000 acre feet of water for irrigation purposes, this amount being obtained from flood water of the Kern river.

A project that contemplates the construction of works costing \$400,000 for impounding all the waters of the Oak Creek water shed and the irrigation of 61,440 acres of Kern county desert land south of the Tehachapi has been laid before the State Water Commission by the Mojave Mutual Land and Water Company, a San Francisco corporation. The company seeks permission to appropriate all of the water of Oak Creek and Mill Creek, together with all springs, run-

off and flood waters, not less than seventy cubic feet per second for irrigation.

A final opinion has been received from Goodfellow & Eels on the \$400,000 bond issue recently sold by the Oakdale Irrigation District to the effect that the bonds are O. K., the final proceedings have been carried out in accordance with law.

State Engineer W. F. McClure recently approved the application of two projected irrigation districts in Madera and Kings counties to proceed with the formation and perfection of their plans, which includes bonding and construction of ditches. Both projects contain about 15,000 acres which are subject to the assessments of the districts.

Water is now available for all of the water users of the Kalmath project to irrigate 40,000 acres.

### Colorado

An injunction against Douglas Davis, rancher, is asked for in a suit filed in the district court recently by the Turkey Creek Irrigation Company to restrain him from diverting the water of the creek to his own land through a headgate about a mile above that of the company. It is claimed in the complaint that Davis began diverting the water a year ago this month.

Title to the water rights was acquired by the irrigation concern Oct. 23 of last year, it is alleged, but by reason of the defendant's actions in taking out the water before it reaches the lower headgate, according to the complaint, 1,500 acres of crops bid fair to be partly or totally ruined.

The company's ditch is 11 miles in length and was purchased from the Teller Reservoir & Irrigation Company. It was constructed between the fall of 1909 and the winter of 1910. Its capacity is 60 cubic feet of water per second, supplying 15 ranchers.

### Idaho

Approximately 5,000 acres of state land within the Payette-Boise irrigation project were sold at public auction at Caldwell by State Land Commissioner George Day today. The bidding was spirited, choice parcels being sold for from \$60 to \$83 an acre. Commissioner Day declared that the state would realize \$150,000 from the sale.

Martin & Cameron, of Boise, have filed notice of appeal from the decision of Judge Carl Davis in granting irrigation district No. 1 of Ada county. The district was granted some weeks ago and commissioners appointed. The attorneys opposing the district are interested in the creation of a much larger district, which covers the same territory as the smaller district which was created.



Messrs. Nesbit, Pence and McFarland are completing the building of a 36-inch syphon that is 170 feet long, which they are building in place of a flume for the irrigation of 400 acres of fine land at a point near Boise.

The Public Utilities Commission has received from W. C. Howie, of Mountainhome, representing some 15 citizens of that place, a protest against the application of M. E. Hughes, trustee, to increase water rental charges to patrons of the Mountainhome Co-operative Irrigation Company, on the ground that the commission is without power to fix rental charges already provided by the contract. The petitioners ask that the application be denied; that the owner of the system be required to make improvements and repairs necessary; that the Mountainhome Co-operative Irrigation Company and J. H. Brady be made parties to the action and that cause be shown why the company and Mr. Brady should not be charged a reasonable rental for the system and be made to pay their proportion of the cost of repairs and improvements.

A new irrigation project comprising 7,000 acres in the Little Willow and lower Big Willow valleys, about 10 miles east of Payette, is to be built this year at a cost of approximately \$210,000, bonds for this amount to be issued. It is understood the Wickahoney Land & Water Company will purchase the bonds and will have charge of the construction of the dam, canals and laterals. The project is to be turned over to the settlers when completed. A reinforced concrete dam, 85 feet high, is to be built as a part of the project. The dam will impound 38,000 feet of water, which

will insure an ample supply of water for the full irrigation season.

The Little Willow and lower Big Willow valleys are fully settled and much of the land is producing crops. The land in these valleys is very rich and productive and is capable of producing immense crops when irrigation water is applied.

#### Miscellaneous

A novel pump has recently been installed upon a California irrigation project. It pumps the water from a flowing stream by using the force of the stream to drive its wheel. This wheel, which is eight feet in diameter, includes eight broad paddles and is floated upon two pontoons anchored to the bank of the stream. A driving rod from this wheel connects with the handle of an ordinary hand pump so that the current in turning the wheel operates the pump, conveying water from the pump into galvanized iron piping. This wheel has a pumping capacity of 500 gallons of water raised to a height of fifteen feet within twelve hours.

#### Kansas

George Weisharr, of Scott City, has gone to Kansas City to confer with the supply houses furnishing the material for the \$50,000 electric power plant being constructed on the Lough 5,000-acre farm to operate the pumping plants used for irrigating their holdings.

#### Montana

The B. L. and I siphon, which has been constructed to carry the water of the irrigation canal which waters the Billings bench over Alkali creek canyon, has been completed and is ready for use.

The siphon has been constructed at a cost of \$16,000. It is 1,050 feet long and has a diameter of 90 inches. It is large enough to carry the full head of water of the B. L. and I. company's big ditch. It is built of wood with steel reinforcements and with concrete containers.

The Reclamation Service is inviting bids for the construction of canals and structures on the Flathead irrigation project at points 3 to 10 miles south-

### Here's Something New about California For You

Two parties of Eastern farmers saw California under my personal escort last fall. It was not a land-selling trip—it was solely for investigation.

We were guests of over forty local communities. Their Chambers of Commerce and Boards of Trade provided the automobiles and guides who showed us the agricultural activities in their neighborhoods.

We saw irrigated fruit farms. We saw alfalfa making large yields under irrigation. We saw diversified farming with its sure returns paying still better because of irrigation.

#### A Book of Pictures

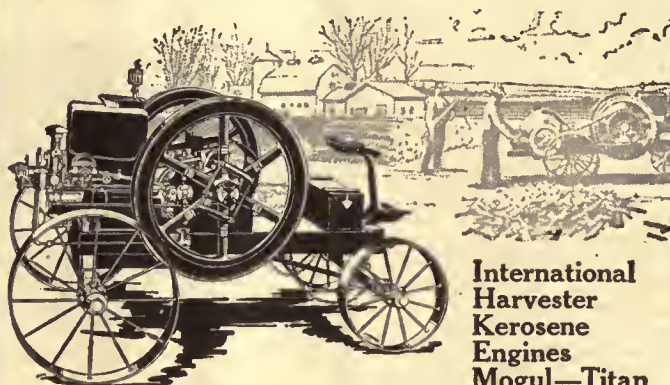
taken on this trip is now ready for free distribution. We would like to send you a copy.

You can prolong your active business life at least fifteen years in California. It is a country where you can farm twelve months in the year. You need not spend a large share of your earnings just to keep warm.

Write me today. Let me help you plan your trip. Reduced fares next Spring and Summer will give you a chance to see the San Diego Exposition and agricultural sections of California at small cost. Winter tourist fares now in effect. Ask all the questions you want and say "Send Farmers' Special Book."

C. L. SEAGRAVES, Gen. Colonization Agt.  
Atchison, Topeka & Santa Fe Ry. Co.  
2234 Railway Exchange, Chicago.

## Welcome News on Engines



International  
Harvester  
Kerosene  
Engines  
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### INTERNATIONAL Harvester Mogul and Titan

engines work successfully on kerosene, running on light or full loads. They use the least expensive of oil fuels. You are not limited to one kind of fuel, as with a gasoline engine, but can use any kind that is most convenient or least expensive. That is a very real advantage.

You know something about IHC engines. You have heard of their thorough reliability, the good material and workmanship that goes into them, the ease with which owners get repairs and service when needed, the years they last—and the other points that have sold a quarter million IHC engines.

But do you appreciate what real kerosene-burning means—what it saves you in money—how it assures you an unlimited supply of cheap fuel? You need Mogul or Titan kerosene-burning engine power to be sure of always having power at a price you can afford.

Ask the IHC dealer to show you a Mogul or Titan engine—sizes from 1 to 50-H. P. If you prefer to write us, we will tell you where you can see our engines and send you catalogues at the same time. Drop a card to the address below.

### International Harvester Company of America

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west of Polson and 6 to 8 miles west of Ronan. The bids will be opened at St. Ignatius May 25. The bids cover excavation, concrete work, lumber and steel.

#### New Mexico

The water line in the big Elephant Butte reservoir has reached the 100-foot mark and almost 650,000 acre feet of water is stored for irrigation purposes for the present season.

The flume and canal being constructed by the Llano Irrigation Company at Questa is well under way. A large force of men, with teams, are rapidly putting the canal in shape. Work on the flumes, which aggregate about four thousand feet in length, is under the direct supervision of Charles E. Palmer, of Red River. The canal, flumes, etc., are being constructed by citizens of Questa for the purpose of irrigating about three thousand acres of land lying between Questa and Cerro. This tract is a portion of the 30,000 acres of state land which was to have been irrigated under the "Sunshine Valley" project. The land was purchased from the state last October by settlers living in the vicinity of Questa. The waters to be used in the irrigation of this project will be stored and diverted from the Cabresta lake and creeks.

#### Oregon

The proposal to organize an irrigation district for the reclamation of about 16,000 acres of land in the Squaw creek section of Crook county failed to carry last week. According to J. W. Brewer, secretary of the Oregon Development Bureau of the Portland Chamber of Commerce, who went to aid in the formation of the district, the heavy adverse vote was due to the objection of land owners to the proposed boundaries of the district and to the belief that there would be insufficient water for the reclamation of all of the tract. It is likely that a new petition will be circulated, eliminating some of the dry homesteads, and that the next vote will be favorable to the creation of the district.

Information has been received that the financing of the Teel irrigation project was completed here yesterday when directors of the district awarded \$1,100,000 6 per cent construction bonds to Henry J. Kaiser, the highest bidder.

The Teel project embraces 20,000 acres adjacent to Echo. Water will be taken from John Day watershed. Mr. Kaiser is president of the Kaiser Construction Company, Vancouver, B. C., with a Portland office at 1118 Northwestern Bank building.

#### Texas

W. L. Rockwell, of San Antonio, of the federal bureau of irrigation, announces that the department will detail an expert to the Plainview shallow water belt for three months during the summer to make a complete survey of the irrigation proposition at Plainview.

#### Washington

A meeting of Horse Heaven people was held at Prosser May 6 to consider calling an election to vote bonds for the construction of an irrigation system. Judge Carroll B. Graves, chief counsel, and L. M. Rice, chief engineer, of the Kilckitat Irrigation & Power Company, who made surveys, were present. A district of more than half a million acres is already organized, and if thought opportune the directors will call the election at the earliest date.

The public service commission in an opinion handed down recently holds unreasonable and unjust a charge of \$7 per acre for water for irrigation purposes, which has been the rate of the Consumers' Ditch Company, successor of the Hanford irrigation project in Franklin county. The new rate is fixed at \$4.66 per acre and is based on the consideration of a fair return, the maintenance charges, fixed charges and cost of pumping being three items figured in.

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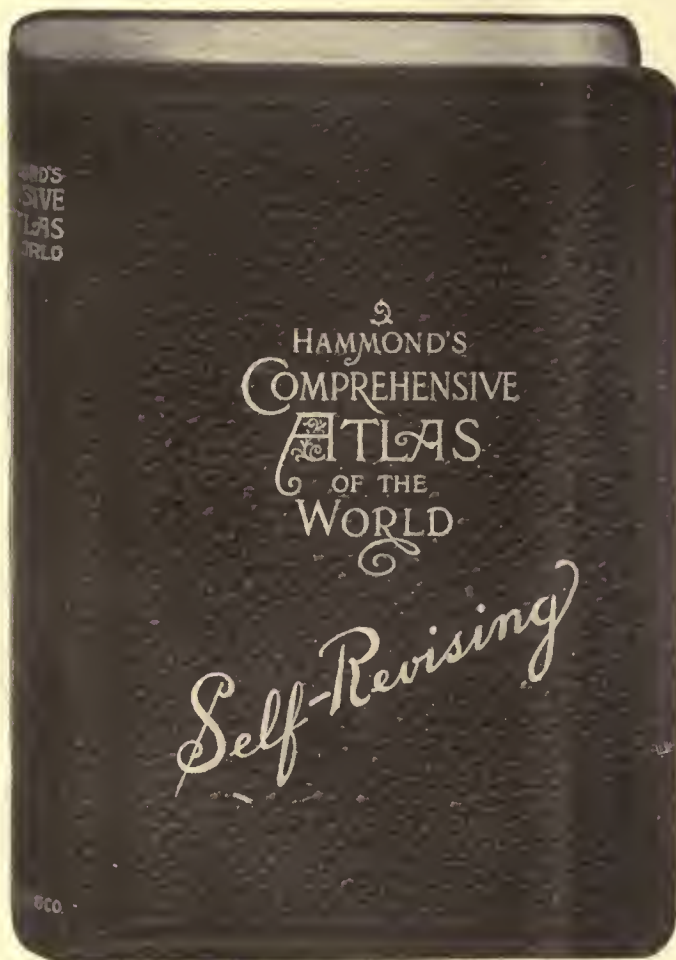
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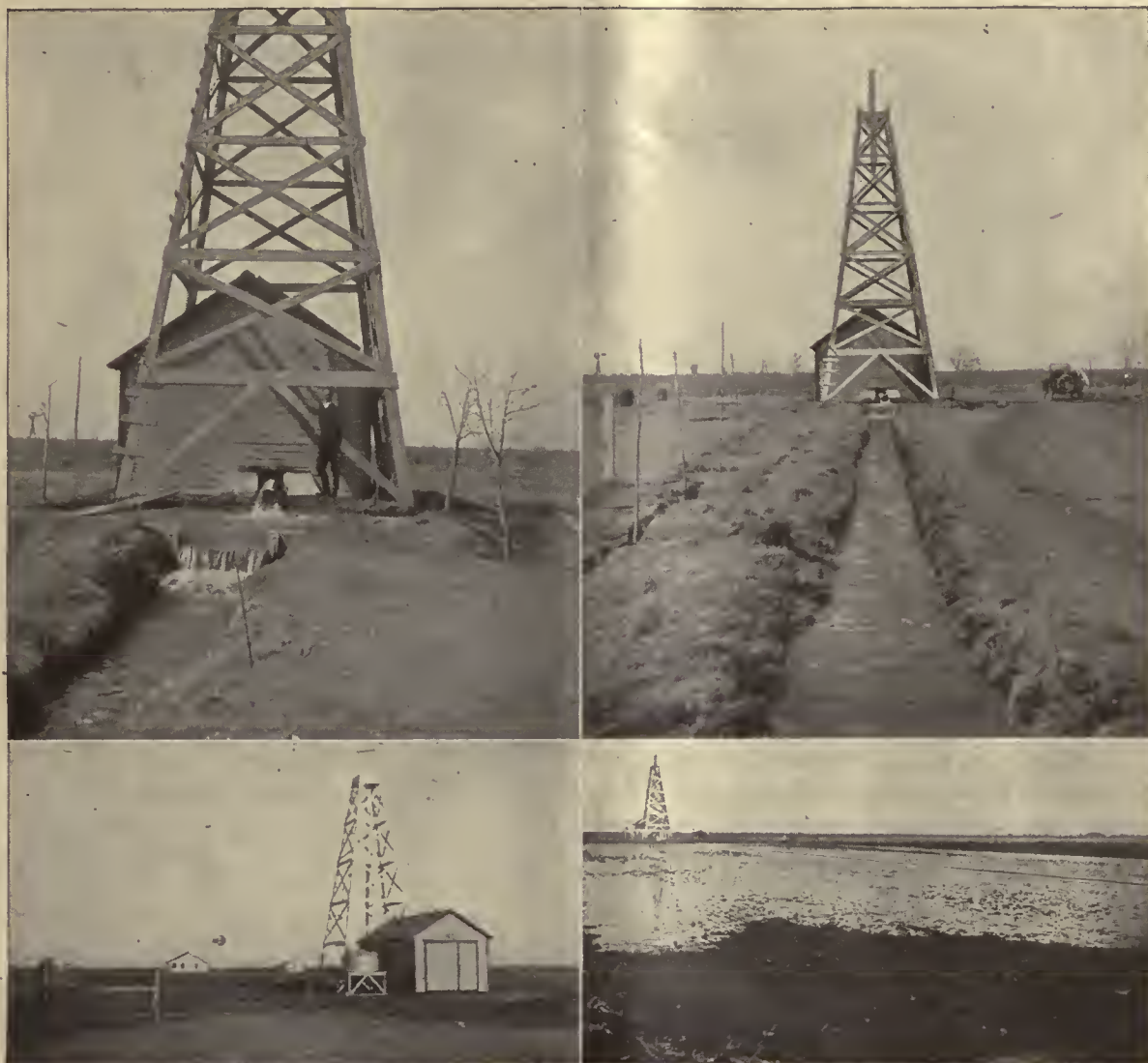
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The above illustrations show installations of this Company. At top are two views of pumping plant on the demonstration farm. Below, at left, buildings on one of the farms of this Company (pump house in foreground and house in the distance).

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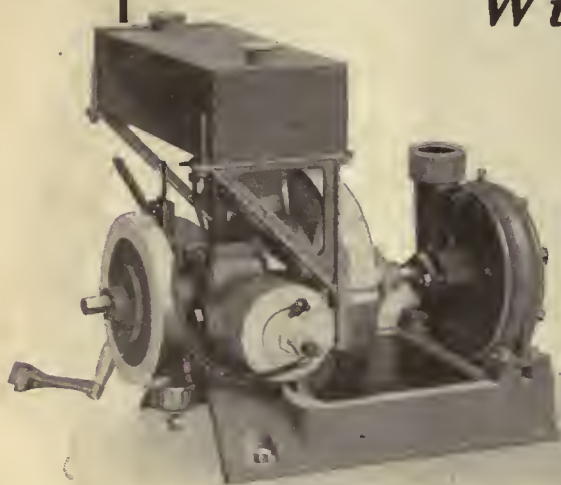
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# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, JULY, 1916.

No. 9

## THE IRRIGATION AGE

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### Big Lost River Irrigation Project

In February, 1916, the state land board of Idaho entered into a contract with the Utah Construction Company for the completion of the Big Lost River Irrigation Project, whereby the company agrees to construct the works including a reservoir, according to plans and specifications approved by the state as adequate to irrigate the Era Flat and Arco tracts of the original segregation at the rate of two-acre feet of water per acre.

The construction company agrees and contracts that the above described sections of the system known as the first unit, will be supplied water by May 1, 1918. This first unit contains 20,000 acres.

The price of water under the new contract is \$40.00 per acre for Carey Act or private lands payable in fifteen annual installments with interest on deferred payments at 6 per cent.

Those holding contracts with the Big Lost River irrigation project will, in all cases, be required to pay the full \$40.00 per acre for water no matter whether or not they held contracts with the original promoters for a less price. It was a notorious fact that under the old regime various and sundry prices were to be paid for water. Under the new deal all will pay the same price, but those who held contracts with the promoters for less than \$40.00 will be required to pay the difference between their old contract price and the present figure quoted. Many

buyers got in under the old company for as low as \$25.00 per acre, and it is hinted that many who could pay spot cash were let in at an even lower price; in every instance these people will be compelled to pay the difference between the amount paid in and the present established price—\$40.00.

This is a move in the right direction and the same plan should be adopted by other states. It is expected that other similarly mismanaged projects in Idaho and elsewhere will be handled in this manner and that great good may result to the original entrymen and those who undertake the gigantic work of rehabilitation.

### Many Uses for Henry's Ford

The latest word about the extermination of gophers is a statement in the Reclamation Record of recent date. The process is carried out by the assistance of that much maligned but very useful outfit known as a Ford car. "Where strychnine fails use a Ford."

It is known that gophers "got wise" to strychnine, but this new method is fatal. The system is to attach one end of a rubber hose to the Ford exhaust pipe and place the other end into the gopher hole, making the joint tight with a little dirt pressed down with the foot, thus filling the hole. Run the Ford for a few minutes, and this latest Ford "peace potion" reduces Mr. Gopher to a state of innocuous desuetude. A man with a Ford or for that matter

any other machine run by gasoline, is able to put the quietus on a large number of gophers in a day. There is no reason why the same treatment should not help to get rid of prairie dogs where they are plentiful enough to cause loss.

**Concerning  
Elephant  
Butte  
Dam**

The placing of an embargo on the water of the Rio Grande river, north of the Elephant Buttes, has given rise to many complaints from the settlers and promoters of various irrigation projects throughout northern New Mexico and Colorado, where the stream has its rise. The principal cause of dissatisfaction comes from the fact that Texas, whose active citizens have been at work since 1903 in the interest of this great storage reservoir, has no right to ask for assistance from the Federal government under the provisions of the Reclamation Act, owing to the fact that all public lands in Texas were held by the state and disposed of for purely state purposes, hence there was no so-called government land within its borders, and as a consequence, it could not take advantage of the provisions of the act, which instructs the secretary of the interior, under Section 2 of that act as follows:

"That the Secretary of the Interior is hereby authorized and directed to make examinations and surveys for, and to locate and construct, as herein provided, irrigation works for the storage, division and development of waters including artesian wells and report to congress, etc., etc., and the location of the lands which can be irrigated therefrom, etc., etc."

The Act also specifies the states to be included in and benefited by the Act as follows: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington and Wyoming.

It will be noted by the foregoing that Texas, owing to the condition, previously explained, has no right to call upon the Federal government for assistance under this Act, and a clear knowledge of this condition stimulated the men of western Texas in an effort to so construe this law as to permit the storage of water from the Rio Grande river and its tributaries to be used on the wonderfully fertile soils along that stream in lower New Mexico, and at various points east of El Paso, Texas.

This plan was worked out by bringing up an alleged national and international debt to the Republic of Mexico. This angle gave the promoters a good excuse to build this dam, which impounds in its reservoir a quantity of water that is exceeded in quantity by only one other artificial lake, the Gatun lake at Panama.

The feature that is objected to by New Mexico

and Colorado people who are located on the Rio Grande and its tributaries above the reservoir is that it is not fair to deprive them of water that rises in their respective states in order to pay an old and contested international claim and to dole out water to the people in Texas, who have never been entitled to recognition under the Reclamation Act.

A movement is now on foot to relieve the people of New Mexico of every charge for the cost of the project. They claim that New Mexico should be reimbursed by the United States government by permitting its land owners under government projects in New Mexico to acquire water rights free of cost, and that the land be charged only with maintenance and not construction cost.

Some day we will attempt to give a history of the negotiations between the government officials and the people of Texas, leading up to the present condition.

That the attitude of the people of New Mexico have taken is not unreasonable, is the opinion of all who are familiar with the details. What Colorado people may decide to do in this connection is problematical, but they will no doubt be governed by the result of New Mexico's effort to place the expense on the shoulders of those most greatly benefited.

**Duty of  
Water  
In  
Irrigation**

The quantity of water necessary for irrigation is being generally discussed by the papers in newly irrigated sections of the West, and as there is a variance of opinion and the query is also common in the older irrigated sections, we herewith quote from a recent interview with Prof. G. E. Smith of the University of Arizona Agricultural Experiment Station:

"One might as well ask what size should mens' shoes or hats be made," says the Professor. "The size depends very much on the man. A recent article, widely copied in the press, states that two feet total depth of irrigation per year is the right amount for three-fourths of our irrigation projects. This is a careless statement, likely to lead to much error on the part of farmers and the promoters of irrigation projects. More attention must be given to local conditions in discussions on the duty of water. The length of the growing season, the character of the soil, the kind of crop, and other factors, cause the proper duty of water to vary between wide limits, even in a single state.

"In Arizona the duty of water for alfalfa appears to vary from one foot total depth per year at Lakeside in Navajo county, to six feet total depth per year in the Yuma valley. Even in the same locality the proper duty varies considerably. In the vicinity of Tucson the sandy loam soils appear to



require about five feet depth annually for alfalfa, while the best silt loams or light adobe soils scarcely need four feet total depth. In this conclusion it should be said that alfalfa is the water gourmand, and requires much more water per pound of crop produced than do our other crops. Corn, wheat, barley, potatoes and cotton require much less water than alfalfa, while kafir, milo, Sudan grass and millet require still less than those named.

During recent years much effort has been made to obtain a higher duty of water, that is, to irrigate the same land with less water, and thereby to make a definite water supply suffice for a larger acreage. It is well known that many irrigators apply more water than is needed, in some cases even twice as much, the excess being wasted by evaporation or seepage. Records kept by the Agricultural Experiment Station of the quantity of water applied to alfalfa in the vicinity of Tucson, showed as high as 108 inches total depth in one case, and as low as 14 inches in another. In the latter case the crop suffered for lack of water, while in the former case, needless to say, there was a useless waste, since a large percentage of the water applied sank below the reach of roots into the groundwater zone.

Professor Smith would have proven a valuable man on many of the projects developed since the adoption of the Reclamation Act.

Large areas in Utah, Idaho, Montana, in fact, in all of the so-called arid states, are now proving the correctness of the oft repeated warning about using too much water. The trouble from seepage arises mainly from ignorance on the part of the irrigator, and while this condition often seriously affects the man 'who tries to hog the water,' it more frequently works serious injury to an innocent neighbor who may perhaps understand the science of irrigation and who is sufficiently familiar with his soil conditions to know just how much water each field requires or will stand.

The Weber Canal Company of Utah is now confronted with several suits which involve this condition of a neighbor's carelessness. Our readers are requested to furnish us additional information on this subject.

#### Horse Heaven Irrigation District

Elsewhere in the issue we reproduce a copy of the resolutions adopted by the Horse Heaven Irrigation District. These resolutions explain why the election called for June 6, 1916, that was to ratify the plan to make a bond issue of \$15,000,000 for the purchase of rights and development of the great Horse Heaven project was delayed to a later date. The many obstacles encountered in the development of a project of this magnitude caused the directors to take this step so

that sufficient time could be given each interested land holder to obtain knowledge as to the purport and intent of this bond issue. There was fear among the men active in this movement that the entire project plans would be placed in jeopardy by a vote, which would result in refusal to put through the bond issue.

There is little doubt about this bond issue carrying as soon as the majority of land holders under the proposed plan are familiar with all the facts.

This project will represent a larger outlay than that of any other district organization within our knowledge and the group of men who have developed the plan are entitled to great credit. Their efforts have required much work and patience and they have been confronted by perplexing problems that would have daunted the average group of men.

#### American Federation Of Water Users

The American Federation of Water Users is the title under which the organization mentioned in our issue of June, will be known, and the annual meetings that will take the place of the migratory irrigation congress of past years will be conducted under its guidance.

It has been decided to hold an annual meeting of the officers and members the 32 Water Users' Association under the title the American Federation of Water Users, either at Salt Lake or Ogden, Utah, and work is now going on to interest all members, 90,000 in number, under Federal projects.

As soon as the work of organization is well under way, a move will be made to interest water users on Carey Act and private projects. Roughly estimated, there are 300,000 irrigators in the arid states, all of whom would be interested in a permanently located annual meeting when all subjects of interest could be gone into, and where also grievances may be aired and resolutions passed to be presented to our national congress at Washington. THE IRRIGATION AGE will keep its readers posted on the development of this work. Any suggestions that may help to strengthen the Federation movement will be given due prominence in these columns.

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Send \$1.50 for 1 year's subscription to the IRRIGATION AGE and bound copy of THE PRIMER OF IRRIGATION. If you desire a copy of The Primer of Hydraulics add \$2.00 to above price.



## POWER DEVELOPMENT—RECLAMATION SERVICE PROJECTS

[Extract from address of Arthur P. Davis, director and chief engineer, U. S. Reclamation Service, at conference of Electro-Chemical Engineers, New Willard Hotel, Washington, D. C., April 7, 1916.]

The importance of nitrogen products in the manufacture of explosives and in the fertilization of agricultural lands has been emphasized by the European war in calling attention both to the need of nitrates and to the possibility of the Chilean supply being cut off at any time.

The principal element needed for supplying this need, as well as many other electro-chemical industries that might be developed in connection therewith, is a large amount of electric power.

The United States Reclamation Service in the construction of irrigation works has on many of its projects a by-product in the shape of hydro-electric power, usually in blocks too small to be considered in connection with any extensive electro-chemical industry, but in a few cases large enough to be thus utilized.

In addition thereto, investigation has been made of possible power development for the primary purpose of pumping water for irrigation and the information thus obtained is interesting in connection with this subject.

### Power Development on Minidoka Project

On the Minidoka project in southern Idaho, the Reclamation Service has built a diversion dam which provides also considerable storage and a head of 46 feet upon the wheels of a power plant constructed there with a capacity of 10,000 horsepower. This capacity can be doubled at a reasonable cost.

The power now developed is fully utilized during the summer months for irrigation pumping, and a large amount of power is still available for use in the winter.

Large deposits of limestone are located near one of the pumping plants which a double transmission line reaches, and the availability of this developed power with convenient railroad facilities is considered one of the most favorable locations for an experimental installation for the fixation of nitrogen.

A further development of 10,000 horsepower could be cheaply made, which could be utilized the year around. This region also is within easy reach of one of the largest deposits of phosphate rock in the world, also in southern Idaho, and is hence a convenient point for the manufacture of ammonium phosphate. The coal fields of Utah furnish an accessible supply of coal and coke.

Undeveloped power sites along the Snake river in the same region could be made to produce several hundred thousand horsepower for 8 or 10 months in the year.

### Power Development on the Boise Project

In Idaho the Reclamation Service has built a high masonry storage dam about 240 feet above the river bed. More than 1,000,000-acre feet of water have to pass this dam site every year, all of which is used for irrigation in minimum years, but in ordinary years there is considerable surplus.

Power development at this dam could utilize the

head in the reservoir which varies from 60 to 230 feet. The quantity of water available during the summer would be about 5,000 cubic feet per second, which would be diminished in the spring and fall, and in the winter only about 200 cubic feet per second could be drawn.

Provision has been made for the convenient installation of power to the extent of 17,000 horsepower at this site. A greater amount could be developed during the summer if found desirable.

### Pathfinder Dam Power Development

The Pathfinder dam on the North Platte river is 210 feet high, forms a reservoir of 1,100,000-acre feet, and intercepts an annual flow which varies from 1,000,000 acre feet to over 3,000,000 acre feet. The water of low and average years is all required for irrigation. It could be utilized for power as it comes from the reservoir, but would be available only six or eight months of the year, and the head would vary from 60 feet to 200.

The site is 55 miles from the railroad, and the highway is both hilly and sandy. Although plentiful deposits of limestone, sand and soda are near, there has been no power development here as yet.

### Power at Elephant Butte Dam

A large amount of power is available during the irrigation season at the Elephant Butte dam, but usually during two or three months of the winter, no power is available.

The power to be developed by using the water drawn from the reservoir as needed for irrigation under the available head in the reservoir at the time drawn. The available head will vary from 65 to 185 feet, and the maximum quantity of water drawn will be about 2,500 cubic feet per second. During eight months of the year it would be possible to develop from 20,000 to 30,000 horsepower, according to the head available and the quantity of water needed for irrigation.

The development of power was considered in designing the dam and six five-foot power outlets were installed. The maximum output from these would amount to 12,000 horsepower. An eight thousand horsepower plant has been estimated to cost about \$420,000.

The construction of a hydro-electric plant for commercial purposes would be unattractive, as a large steam auxiliary would be required in order to operate in the winter when no water is drawn from the reservoir. The feasible power development, however, is well adapted to the needs of pumping for irrigation for which market exists within feasible transmission distance. Limestone is plentiful not far from the dam and coke is obtainable from the mines of northern New Mexico.

### Shoshone Project Power Development

On the Shoshone project a masonry dam has been constructed in the canyon of the Shoshone river about 250 feet above the river bed. This dam furnishes a storage reservoir of about 450,000-acre feet capacity and water is stored primarily for irrigation purposes. The flow of the stream, however, when thus regulated,



is greater than required for the irrigable lands and will furnish a surplus of water which can be used for power purposes during the winter.

The river falls rapidly below the damsite and it is easily feasible to develop power varying from 25,000 horsepower in winter to 40,000 horsepower in summer of average years.

In the immediate vicinity there is an unlimited supply of limestone and a few miles below the power site is a large deposit of native sulphur. Further down the valley, and also in other parts of the State of Wyoming are large and easily accessible deposits of lignite, all of which can be made useful in various electro-chemical industries. There are also considerable deposits of phosphate rock in the State of Wyoming, which could be brought in by rail and used in connection with the process for the manufacture of ammonium phosphate as a fertilizer.

With a high dam and a large reservoir already constructed, together with the proximity of limestone, sulphur, coal and phosphate rock, the Shoshone location constitutes one of the best localities for the establishment of electro-chemical industries on our projects.

#### Iron Canyon Power Development

The Reclamation Service has made an investigation of a large water storage and irrigation project at the head of the Sacramento valley, which contemplates the storage of water by means of a high dam at Iron Canyon, not far from the city of Red Bluff, California.

Various alternatives and possibilities were considered, all of which provide for a dam with excellent opportunities for power development. The quantity of water available would vary from 3,700 second feet to about 5,000 second feet and the head would vary from 60 feet up to 130 feet, furnishing from 25,000 to 35,000 horsepower output at the switchboard. The large storage reservoir available makes this power a very desirable one as a by-product of works constructed primarily for irrigation. Convenient railroad transportation adds to its value for power and irrigation.

This reservoir has also an important bearing on the flood control problem, and there is opportunity to furnish important contribution to the control of the flood water of the Sacramento river, which is sometimes very destructive. The total cost of the most comprehensive plans considered will be in the neighborhood of \$16,000,000.

It is estimated that by proper manipulation of the storage reservoir at Iron Canyon, a reduction in the cost of protective work proposed for the control of the floods of the Sacramento below this point may be made of about 50 per cent in the upper end of perhaps 10 per cent in the lower end of the river system.

#### Power Development on Flathead River

Large power possibilities exist near the outlet of Flathead lake, and preliminary studies have been made of the development of power in this vicinity. The flow of the Flathead river is rarely less than 4,000 second feet, and this can be increased to 10,000 second feet by the construction of a dam in the Flathead river below the outlet of Flathead lake converting this into a storage reservoir. Such a dam would produce a head of 340 feet and make possible the development of from 200,000 to 300,000 horsepower. So large a storage as this, however, is handicapped by the ownership of land around Flathead lake, which would make

damages very large, but a moderate regulation would develop a large amount of power. There are several other power sites on the Flathead river which would utilize the same water and large power developments could be located there.

#### Columbia River Power Development at the Dalles

The Reclamation Service in co-operation with the State of Oregon, conducted an elaborate investigation in 1914 of the power and irrigation possibilities which could be developed by the construction of a dam in the Columbia river at what is known as "Five Mile Rapids" near The Dalles, Oregon.

At this point the Columbia river channel suddenly reduces from a width of about 1,800 feet to a width of only about 150 feet and continues between two rock walls in a very narrow and deep channel. The plan proposed is to build a dam at the narrow neck where the river first enters this gorge, the construction of a power canal, and the erection of a power house at a point about  $1\frac{1}{2}$  miles below the damsite. The quantity of water available varies between 50,000 second feet minimum and 1,000,000 second feet maximum. The head for plant operation will vary from a minimum of about 45 feet to 105 feet maximum. The power which could be developed continuously twenty-four hours per day and 365 days in the year, will aggregate about 480,000 electrical horsepower, with the possibility of the development of additional large blocks of power for a part of the year. It is estimated that this project would cost about \$50,000,000. The secondary power possible to develop is as follows (This is in addition to the primary power of 480,000 horsepower):

120,000 H. P. 11 months in the year.

220,000 H. P. 10 months in the year.

320,000 H. P. 8 months in the year.

It has been proposed to use this power for irrigation by pumping, in the smelting of ores, the different electro-chemical processes, etc.

#### Priest Rapids Power Development

At the Priest Rapids on the Columbia river above the mouth of the Snake river, an average head of sixty feet can be obtained, which, with the minimum discharge of the river of about 40,000 cubic feet per second over 200,000 horsepower, can be developed the year around.

Fifteen or twenty per cent of this power could be used during the summer for irrigation purposes, but as the summer water supply is higher than the winter, the amount would be about the same the year around.

Good river navigation is available for bringing the needed limestone.

#### TAP UNDERGROUND RIVER FOR IRRIGATION

As the result of underground water experiments and investigations by the University of Nevada, several thousand dollars are to be spent in experiments under the direction of the university engineers and F. L. Bixey, federal expert, now working with the university in the famous Amargosa desert, in Death valley. London capital, which finances the Tonopah and Tidewater railroad, is backing the project.

Drills and necessary machinery are already at Death Valley Junction, and work will be begun soon.



## BOARD OF DIRECTORS OF LAND OWNERS' ASSOCIATION HORSE HEAVEN PROJECT PASS RESOLUTIONS

Resolutions adopted by board of directors of Land Owners' Association at a meeting held at Prosser, Washington, June 3, 1916, which resolutions were also re-adopted at a mass meeting held in the same city on the same date:

First: Be it resolved that on account of the lack of information possessed by the voters as to the purport and intent of the proposed bond issue to be voted on at an election to be held June 6, next, by the Horse Heaven Irrigation District, and because of the possible injury to the project that might result should the election be held and the bonds voted down, the directors of the Land Owners' Association request the directors of the Horse Heaven Irrigation District to cancel the call for said election at this time.

Second: That we request the irrigation district directors to levy an assessment of six cents per acre for the purpose of raising funds to investigate the present status of the rights and claims of the Klickitat Irrigation and Power Company and to determine the value of those rights to the Irrigation District and for and further investigation relative to the general feasibility of the object that they may deem wise.

Third: That for the purpose of accomplishing the results mentioned in resolution number two, at the earliest possible moment we request the said District Directors to engage at once or as soon as possible—

1. A permanent secretary who would devote his entire time to the interests of the project.
2. An irrigation engineer.
3. An irrigation attorney.

Fourth: That these employees be instructed to

proceed at once to secure the information desired and to submit their reports to the District Directors for further consideration. For the purpose of enabling them to arrive at a proper determination of the important questions involved the District Directors shall employ a Consulting Board consisting of two irrigation engineers of national repute and an irrigation attorney, said Consulting Board to examine into and pass upon the data secured by the employees first mentioned and to report their findings above to the Irrigation District Directors; that the District Directors shall report to the voters of the district the findings above referred to and shall make such recommendations for further action as to them shall seem advisable.

Fifth: That in choosing the secretary a person shall be selected whose experience and qualifications shall be such as to give weight and standing to any suggestions he may offer to the Directors, to the end that said suggestions may be adopted and that substantial and continuous progress be made in accomplishing the purposes for which the Irrigation District was formed, to wit: the irrigation of Horse Heaven Lands.

Sixth: Since W. A. Kelso, one of the present Irrigation District Directors is a stockholder in the Klickitat Irrigation and Power Company and is therefore disqualified from acting in any negotiations with the said company for securing their rights, we urgently request Mr. Kelso to at once resign from said Board of Directors, thereby removing the obstacle that now prevents said Board from legally carrying on such negotiations.

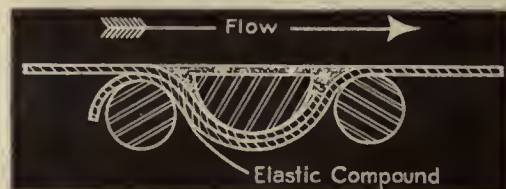
## PRACTICAL AND DURABLE SHEET METAL FLUMES

The type of semi-circular metal flume, illustrated by the accompanying photographs of various installations, has proven highly practical and durable in actual service on a great number of irrigation and power projects in the far west. The construction is that which has become well known under the name "Lennon Type," but, the various manufacturers who are producing this form of conduit, having adopted "Armco" (American Ingot) Iron for all the sheet metal portions, it is now being sold as the "Armco" Iron Flume.

The patented joint is a very simple and practical one and, when the flume is erected with any degree of care and judgment, results in a conduit which is perfectly water-tight. It is claimed to be very easy to assemble, and advices from those engineers who have had installations of this flume under their supervision seem to bear out this assertion.

The characteristic feature of the joint is the use of two rods as external members with that of a half-oval for the internal member. This device has much to recommend it on theoretical grounds and apparently these expectations are borne out in actual service.

The beads in the flume sheets are made on a slightly larger radius than the half-oval iron which is the interior member, thus allowing a small space between the sheets and the half-oval on the line of the internal surface. This space and a slight thickness over the half-oval itself are filled with an elastic compound of very high melting point, which serves several practical purposes. The most important use of this space and its elastic filler is that of making each regular joint an expansion joint, since it gives ample opportunity for the expansion and contraction of the sheets under extreme changes of temperature. Thus this type of flume when placed on a wooden substructure needs no special provision for expansion and contraction.



Cross-sectional view of the joint of the "Armco" Iron Flume.





The Illustrations Shown Herewith Present Various Sections of Flume Work Throughout the West. Photos  
Furnished by the Armco Iron Culvert & Flume Manufacturers' Association.

### PUMPING WATER EFFICIENTLY

There are days when the irrigator who pumps his water must ask himself whether or not he is doing it efficiently. That is, for each dollar expended for fuel, is he getting the maximum quantity of water on the land.

Development in the design of engines and pumps for irrigating purposes has been very rapid during the last few years, yet as one travels through the country where water is being pumped it is surprising how many plants are operating at a low degree of efficiency.

Frequently pumps of low efficiency are installed. Stock pumps are frequently bought that are not adapted to the conditions under which they are to operate.

More frequently, however, the principal cause of inefficiency is in the installation or in the retaining of an engine of a type that is expensive to operate due to its being a type that has gone out of date and therefore not capable of using low grade fuels.

The earlier engines used for pumping were of the well known gasoline type. Then later came the distillate engines which were practically the same as the gasoline engines except that they were so modified as to burn or partly burn the various distillates and kerosene. These distillate types had incorporated in their construction the same systems of ignition as the gasoline engines and it is well known that electric and hot tube systems of ignition have frequently been a source of more or less trouble.

The distillate types also drew in fuel with the intake air and in order to secure ignition it was necessary to have the air and fuel always in the right proportions. It was necessary to compress the fuel with the air and this process caused preignition if the compression went higher than seventy or eighty pounds. This limitation is said to have kept down the economy of that type of engine.

Later there came on the market what is known as the semi-Diesel or injector type of engine. In this type only air is compressed and that to a desirably high pressure and likewise high temperature. On this type fuel is injected into the combustion chamber at the right time and in the form of a fine spray. The high temperature obtained by a greater compression permits the use of the lowest grades of heavy fuel oil. In this type of engine, not only are the cheapest grades of fuel used but less oil is used to produce the same power.

In the earliest designs of semi-Diesel engines the mistake was made of retaining the trunk piston which had been in use for a long time on most gasoline engines. As a result of this construction there has been in all districts where much pumping is done a good many failures on account of worn pistons and cylinders. This difficulty could have been avoided had a cross head construction been used and a few makers have from the first used that construction with excellent results.

The time is now here when there is no excuse for including in the construction of a new plant an engine of any type but the most recent. It is being demonstrated constantly that where one of the earlier types are now in use it is far better to discontinue its use, even though it may be a new engine, and buy in its place a new and up-to-date type. These later types of engines are dependable and they will burn efficiently the cheapest grades of fuel and while such a change

means added investment yet without question it is being proven that the investment will yield good returns through the added economy.—(Advertisement.)

A good stream of water on the B. & W. Ranch,



Canado, Texas. The water is pumped with a Loomis Oil Engine and is used for rice irrigation. This engine replaced one of the old type.

### THE LAUSON KEROSENE ENGINE

The John Lauson Manufacturing Company of New Holstein, Wis., have recently brought out a new kerosene engine which simplifies the method of handling the fuel and makes a kerosene engine as easy to start and operate as any gasoline engine.

The engine starts on gasoline and after running a few minutes in order to heat the cylinder walls, the cheaper fuel is turned on by means of a fuel changing lever without the necessity of further adjusting the fuel needle valve.

The air is drawn into the carburetor from a pre-heater through which the hot exhaust gases pass, through warming the air to prevent freezing on account of the water feed.

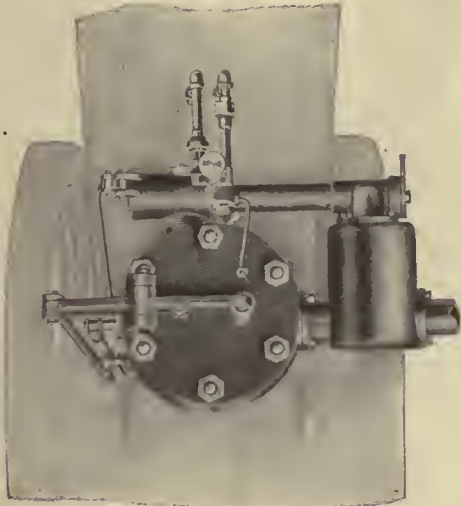
After exhaustive tests in the laboratory of the company it was conclusively proven that any heating of the charge after it leaves the carburetor or atomizer (as it may be more aptly called) not only decreases the maximum horse-power of the engine, but also the efficiency. It was also proven that kerosene can be handled successfully in an engine without any heat being applied. This was done by maintaining a high velocity at the point where the fuel is admitted into the incoming air and keeping the velocity high regardless of the load. With this system the engine will pull as well on kerosene as gasoline and will generate as much power per gallon of fuel.

The kerosene is drawn through a small opening by a high velocity of air which is controlled by a barrel



valve operated by the governor as shown in the sectional view. Thus the amount of the fuel is regulated according to the load conditions without any adjustment by operator.

The small jet of fuel striking the intruding air

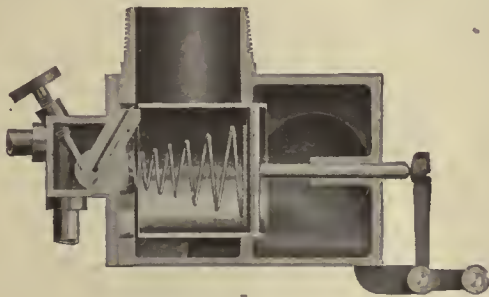


is as thoroughly vaporized as a gasoline carburetor vaporizes gasoline, consequently the Lauson Kerosene Engine gives full rated horse-power on kerosene, the same as it does on gasoline.

Through a separate opening water is automatically drawn into the cylinder on heavy load to prevent extreme temperature, which also improves the lubricating conditions and makes a smooth, quiet running engine when carrying heavy load.

One of the greatest drawbacks to any engine operating on kerosene, distillate or other low grade fuels has always been the diluting effect of the kerosene upon the lubricating oil, as any of the cheap fuels, if not perfectly vaporized, will mix readily with the lubricating oil and destroy its lubricating qualities, thereby causing the formation of carbon and excessive wear on the cylinder, piston and rings.

When an engine does not thoroughly vaporize the fuel it can be detected at once by the most inexperienced layman as all of the liquid fuel will not burn during the combustion and some of it will pass through the exhaust pipe in the form of vapor or white smoke.



A Lauson Kerosene Engine will operate without smoke on all loads, and it is for this reason that they use less than one pint of fuel per horse-power hour and give years of service with the lowest possible cost of up-keep. The Lauson Kerosene Engine is necessarily of throttling governor type in order to maintain a uniform temperature at all times. They run as steady

as a steam engine and are especially adaptable for factory power purposes, mills, elevators, irrigation, pumping plants, city pumping plants and wherever smooth, steady power is required.

Built in sizes from  $2\frac{1}{2}$  to 100 horse-power in the stationary tank cooled types;  $2\frac{1}{2}$  to 28 horse-power in the hopper cooled, either stationary or mounted on steel skids and in the portable type in sizes from  $3\frac{1}{2}$  to 28 horse-power, either hopper or tank cooled.—(Advertisement.)

### LETTERS FROM OUR READERS

Fallon, Nevada, May 31, 1916.

THE IRRIGATION AGE:

Dear Sir:—Enclosed you will find money order for \$2.00, which will set me up to February, 1917. Much obliged to you for kindness received. I think your publication is doing a fine and much needed work.

Very respectfully,

F. M. MURCHISON.

### ADJUSTING IDAHO'S WATER RIGHTS

The Boise, Idaho, Maintenance and Operative Conference, at an important meeting held early this year at Boise, took determined action in favor of a readjustment of water right conditions in that state.

The resolutions passed at the closing session of the conference are as follows:—

"Resolved, it is the sense of this conference that the next session of the legislature of the state of Idaho be requested to enact the necessary legislation to constitute what shall be known as a state water commission or board of control, which shall have authority to administer the public waters of the state.

"This board shall be constituted of three members, one of whom shall be the state engineer, and he shall be the chairman of the board.

"The two other members shall be appointed by the governor for a term of six years, except that in the initial appointment one shall be for only three years.

"This board shall have entire control and authority over the appropriation and use of the waters of the state, and it shall be empowered to adjudicate said waters and fix the duty of the same.

"It is further recommended that an amendment to the constitution of the state be submitted to the voters, to the effect that no water right can be acquired except by obtaining a permit from the office of the state engineer, and subject to the approval of the said board.

"Recognizing the immense value of the water supply of the state of Idaho, and realizing the present inadequacy of dependable data concerning the same, it is hereby resolved that it is the sense of this conference that the imperative necessity for taking steps to acquire this information be brought to the attention of the governor and the next state legislature and that an annual and sufficient appropriation from the state treasury for co-operation with the United States Geological Survey is hereby urged as the best means for accomplishing this purpose."



## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### Arizona

At the meeting of the state board of trade, held in Phoenix May 17, a report was made by Andrew Kimball, chairman of the committee on exhibits for the dry farming and irrigation congresses, to be held early in October of this year in El Paso, Tex.

Through the board of trade the chairman urges action upon the part of other members of the committee, the county fair commissioners, and the various chambers of commerce throughout the state to cooperate with this committee in collecting and assembling the choicest products of their various counties and districts.

All correspondence regarding this should come to John F. Myers, secretary of the Arizona State Board of Trade, Tucson, Ariz.

### California

Legal representatives of more than a score of irrigation companies have filed formal protest in the courts against the purpose of the Lindsay-Strathmore irrigation district officials to drive a series of deep wells along the banks of the Kaweah and St. Johns rivers for the purpose of developing water sufficient to irrigate 15,000 acres of citrus land south of Exeter.

Organization of the Cosumnes irrigation district, of which E. I. Walker is manager, containing 40,000 acres, located fifteen miles southeast of Sacramento between Dry creek and the Cosumnes river, has been completed.

The Cape Horn tunnel, which will furnish water to 10,000 acres of land in the Oakdale irrigation district, was completed recently by James Willison. The contract price for the work was \$58,000, and the tunnel is about a mile and a half long. It will furnish water to part of the famous Orange Blossom district and will eliminate miles and miles of open ditches, which have been causing much trouble and expense in the past.

The directors of the Anderson-Cottonwood irrigation district have let the contract for furnishing all the metal for flumes needed in the construction of the system to a San Francisco firm for \$20,000. The contract for all the fence crossings was awarded to F. H. Neilson of Orland.

Bids for the construction of the metal flumes, the Anderson concrete drop and all the siphons were rejected. New bids will be advertised for. It is expected that the siphons, including the siphon across the Sacramento river to Churn creek bottom on the east side, will cost close to \$65,000.

Property owners of Fair Oaks colony have set about to establish a Wright irrigation district, comprising 3,500 acres, and including Fair Oaks tract, Fair Oaks townsite, Fair Oaks

Park and Fair Oaks addition. The committee, which will circulate petitions for presentation to the board of supervisors next month, asking that a special election be called for the purpose of forming a district, is composed of R. A. Rose, Dr. R. N. Bramhall, J. E. Adams, D. E. Mack and Dr. George Bell. It is proposed to have the petitions ready for the next meeting of the supervisors in June.

The committee named at a recent meeting of Kings county irrigationists met May 27 in order to determine the boundaries of the district for the conservation of Kings river waters. G. B. Chinn and W. L. Scally officiated as chairman and secretary, respectively.

Proposed irrigation projects embracing 200,000 acres of land in Modoc and Lassen counties were considered by Secretary Roscoe J. Anderson and Dr. W. B. Mason of Dunsuir, director of the Northern California Counties' Association, in a 1,000-mile tour of those counties. The inspection of these propositions was made on the invitation of officials of the two counties.

Plans for a large irrigation project in Tehama county have been revealed in the application of E. G. Hopson and A. L. Conrad of Red Bluff to the State Water Commission for 130 second-feet of water from Red Bank creek. The plan includes a proposed concrete dam, 130 feet high, 400 feet on the top and 60 feet at the base, capable of impounding 30,000 acre-feet of water. The development will cost approximately \$400,000, and it is expected that the water will irrigate 15,000 acres.

The Superior California Lands Company will soon begin the work of sinking test wells for the purpose of demonstrating the existence of an adequate water supply for the irrigation of the proposed Jacinto irrigation district, which is to include about 20,000 acres of land at the north end of the Sacramento valley irrigation project.

In anticipation for a heavy demand for laborers in Imperial Valley, due to harvest of cotton next fall, as well as important construction work soon to be under way, a fund has been raised to bring in a necessary number of men to the valley. The Imperial irrigation district and Lower California Cotton Growers' Association have combined to provide \$10,000 for this purpose. San Diego and Los Angeles are to be searched for laborers.

Organization work will be begun this week on the plans for the formation of a consolidated irrigation district to include lands of the Fresno, Consolidated, Alta, Laguna, Kings

and Tulare Lake districts, with the purpose of constructing a new system to handle water from Kings river at a total estimated cost of \$6,000,000. Included in the various districts are 1,119,000 acres of land.

The first unit of the big canal of the Western Canal Company is now filled with water from the Feather river. The work of enlarging the intake has been completed, and a couple of weeks ago water was turned into the ditch from the Feather.

Word has been received from Colusa that the Cheney Slough Irrigation Project has been completed. The 300-horsepower pump at the Mitchell place was tried out and 4,000 gallons of water a minute pumped from the Sacramento river into the large canal for distribution of 20,000 acres planted to rice and orchards.

A letter received from Oroville states that following the decision of the supervisors to authorize the formation of the proposed Thermalito Irrigation district, the board passed a resolution calling for an election on June 14, to be held "for the purposes of determining whether the district shall be organized as an irrigation district and also to elect a board of directors consisting of three members. The project will be divided into three divisions. One director to be elected from each division.

In commemoration of the opening of the big Glen Lake irrigation project and the completion of the \$200,000 mill at Eureka June 8, 9, and 10 will hold what promises to be the biggest celebration in its history.

### Nebraska

Talk of secession of five western counties of Nebraska on the ground that the eastern part of the state is not in sympathy with the west in the fight for water rights on the irrigation projects, is brought to Lincoln by a local attorney who has been interested in various water right cases.

The counties are Scott's Bluff, Banner, Kimball, Morrill and Cheyenne. The territory involved is about 137 by 105 miles, and embraces 14,315 square miles, or about one-seventh of the area of Wyoming.

Those working for secession claim that Nebraska is unwilling or unable to provide satisfactory irrigation laws, so that they can get the best benefit of the federal government's big North Platte irrigation project.

Federal action, with a ratification by the states involved, would be necessary to put the matter through.

### New Mexico

The work of repairing some small locks on the McMillan dam, a unit



of the Carlsbad irrigation project, was started June 7.

Another obstacle, probably the last in the way of success for the Las Vegas irrigation project was removed yesterday when dismissals of appeals from decisions of the district court, relating to water rights on the project, were filed by Judge D. J. Leahy for A. A. Jones, who signed the dismissals several years ago, with the understanding they were to be filed when deeds for lands on the project, given the Camfield Development Company, were recovered.

Twenty thousand acres of land in Rio Arriba county, New Mexico, across the state line from Durango, will be reclaimed through an irrigation project financed by Berne H. Hopkins. Through a deal closed with the Durango Trust Company, Mr. Hopkins has obtained control of the project from parties representing the estate of the late George W. Kutz, originator of the plan. The work will be pushed to completion as rapidly as possible, and the work will begin immediately, according to Ernest G. Miller, an irrigation engineer of Denver, who has gone to Lumberton, where he will take charge of operations.

#### Oregon

Returns tabulated recently showed that land owners in the Malheur valley voted Saturday to organize an irrigation district, 84 to 11. The project contemplates construction of a dam at Riverside, three miles from the railroad, holding 200,000 acre feet of water. Government engineers have reported it to be the most feasible project and the cheapest in the west and 25,000 acres of new land will be put in cultivation, of which 10,000

acres is owned by the Oregon Western Colonization Company of St. Paul.

The articles of incorporation for the Newlon Artesian wells were filed today at the office of the corporation commissioner. The main office of the company will be located at Heppner, in Morrow county. The company is capitalized at \$25,000 and proposes to sell water for irrigation purposes.

The Central Oregon Irrigation Company was refused a writ of prohibition restraining and forbidding the state public service commission from doing anything in respect to the complaint of water-users against the company, in a decision of the supreme court early in June.

The irrigation company claimed that the state public service commission had no authority to regulate its rates, service and charge methods, and that it was not a public utility under the commission's jurisdiction.

Because the State Water Board has not yet determined water rights along

the Silvies river, State Engineer Lewis, on June 5, announced that he had refused to concur in the United States Reclamation Service report covering proposed irrigation development in Harney County by storage of the waters of the Silvies river. The report of the Reclamation Service contemplates the improvement of about 60,000 acres of land by the construction of the Silvies Valley and Lower Silvies reservoirs at a combined cost of \$950,000. By the elimination of all waste, it is estimated that 40,000 acres more can be irrigated. The report also points out the possibility of reclaiming 15,000 acres in the west end of Malheur Lake.

Irrigations of new lands in the Silver Creek and Warm Springs valleys, by storing the water now wasted from Silver creek into Harney and Silver lakes, is discussed as feasible. The estimated cost of building the Silver creek reservoir is \$400,000.

Irrigation development is on the increase and the year 1916 will see the sale of several bond issues on large projects in Oregon. Such is the belief of Attorney Claude McCulloch of the law firm of West &

## Here's Something New about California For You

Two parties of Eastern farmers saw California under my personal escort last fall. It was not a land-selling trip—it was solely for investigation.

We were guests of over forty local communities. Their Chambers of Commerce and Boards of Trade provided the automobiles and guides who showed us the agricultural activities in their neighborhoods.

We saw irrigated fruit farms. We saw alfalfa making large yields under irrigation. We saw diversified farming with its sure returns paying still better because of irrigation.

#### A Book of Pictures

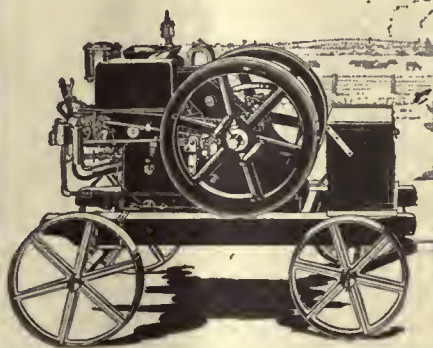
taken on this trip is now ready for free distribution. We would like to send you a copy.

You can prolong your active business life at least fifteen years in California. It is a country where you can farm twelve months in the year. You need not spend a large share of your earnings just to keep warm.

Write me today. Let me help you plan your trip. Reduced fares next Spring and Summer will give you a chance to see the San Diego Exposition and agricultural sections of California at small cost. Winter tourist fares now in effect. Ask all the questions you want and say "Send Farmers' Special Book."

C. L. SEAGRAVES, Gen. Colonization Agt.  
Atchison, Topeka & Santa Fe Ry. Co.  
2284 Railway Exchange, Chicago.

## Power for Forty Farms



Mogul and  
Titan  
Engines



**T**WENTY Titan engines of all sizes, all kerosene burners, were lined up in front of the I H C dealer's store at Litchfield, Minn., one day last summer. That day their new owners took them out to supply good, reliable power on twenty farms. A few months later Litchfield saw twenty more farmers take Titan engines out to their farms.

Two big I H C engine delivery days in that town last year. In many hundreds of towns you will find this same popularity of I H C Mogul and Titan engines—the best farm power—Grand Prize winners at San Francisco.

You must have an engine—then buy an International Harvester engine—Mogul or Titan. It will keep down your fuel and repair bills, deliver the most power with least trouble, and save you more hard work than you can realize now.

International Harvester engines are made in all approved styles, sizes from 1 to 50-horse power, operating on low as well as high-grade fuels. Some local dealer near you handles Mogul or Titan engines. If you don't know him, drop us a line. We'll send you full information, and make it easy for you to get the best farm engine made.

## International Harvester Company of America

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McColloch, after a two weeks' trip in the eastern part of the state and western Idaho going over irrigation projects.

#### South Dakota

High winds, causing six-foot waves in the diversion canal on the Belle Fourche irrigation project of the government at Belle Fourche, resulted in impounding out a number of cement blocks in the big dam that will require several weeks to repair. The water from the canal has been turned off so that it will not run into the reservoir until the damage is repaired.

#### Texas

An irrigation plant and power house at Bay City, owned by the Gravity Irrigation & Power Company, has been ordered sold under foreclosure proceedings by Judge Waller T. Burns in the federal court.

W. I. Drummond of the International Irrigation Congress has announced that there will be a local class of competition at the fall festival, the first prize arranged for being a \$25 silver trophy cup from George R. Le Baron. This prize will be offered for the best alfalfa exhibit from the Rio Grande valley. Local merchants will be asked to add to the prize list.

#### Utah

People living in east Juab county are rejoicing over the possibility of obtaining water for irrigation from the Gunnison reservoir. A preliminary survey has been made for the proposed canal, which shows the canal can be built for \$1,000,000, furnishing about 60,000 acre feet of water. The ditch will be approximately 60 miles long, from the Gunnison reservoir northeast of Gunnison, to Nephi.

#### Washington

The Commercial Club at Toppenish was host to more than 200 persons at a banquet and jollification in celebration of the initial appropriation of \$200,000 for the Wapato irrigation project. Judge Carroll B. Graves of Seattle spoke. There were representatives from every community in the Yakima valley from Pasco to Ellensburg.

Hundreds of inquiries are being made daily at the offices of the Great Northern Railway Company at Tacoma in regard to the opening of the Okanogan valley irrigation project July 7 and 8. The commercial clubs of Oreville and Tonasket, Wash., are preparing to entertain thousands of visitors, many of whom will be from Tacoma.

The opening of the headgates will turn water on 10,000 acres of fertile soil, extending 25 miles south of the international boundary line, on both sides of the Okanogan river, through the most picturesque county in that section of the state.

Delegations are going from all parts of the state and British Columbia. Reduced rates have been made by the Great Northern in Washington, tickets being on sale July 6, 7 and 8.

It is said this promises to be one of the biggest events in the history of Eastern Washington.

Superintendent L. M. Holt of the Indian Irrigation Service has found it necessary to begin dredging in the Yakima river at Union gap to open up the inlet to the intake of the reservoir canal. The recent flood in the river threw up a bar across the intake, and since the river receded the canal is not getting its normal flow.

#### Wyoming

Governor John B. Kendrick's unexpected withdrawal of state support to the cooperative irrigation investigation work, which is being conducted in Wyoming by government experts, will result in the permanent closing of the department which is in charge of Justin T. Kingdon, who has offices in the First National bank building here, as soon as the work now under way can be completed, according to government advices.

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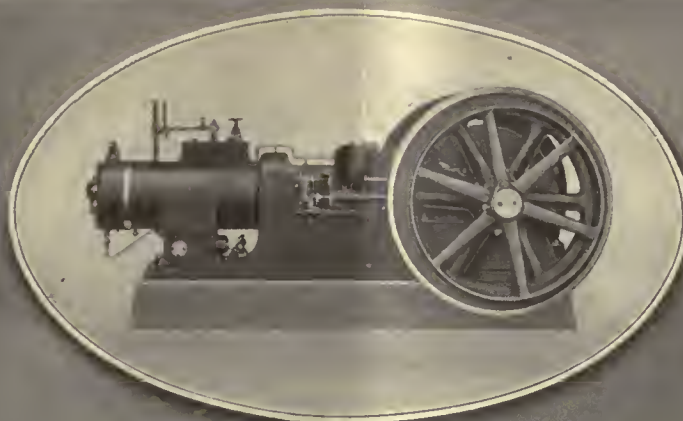
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Loomis Oil Engine being placed on foundation; replacing a distillate engine in the pump house in the background.



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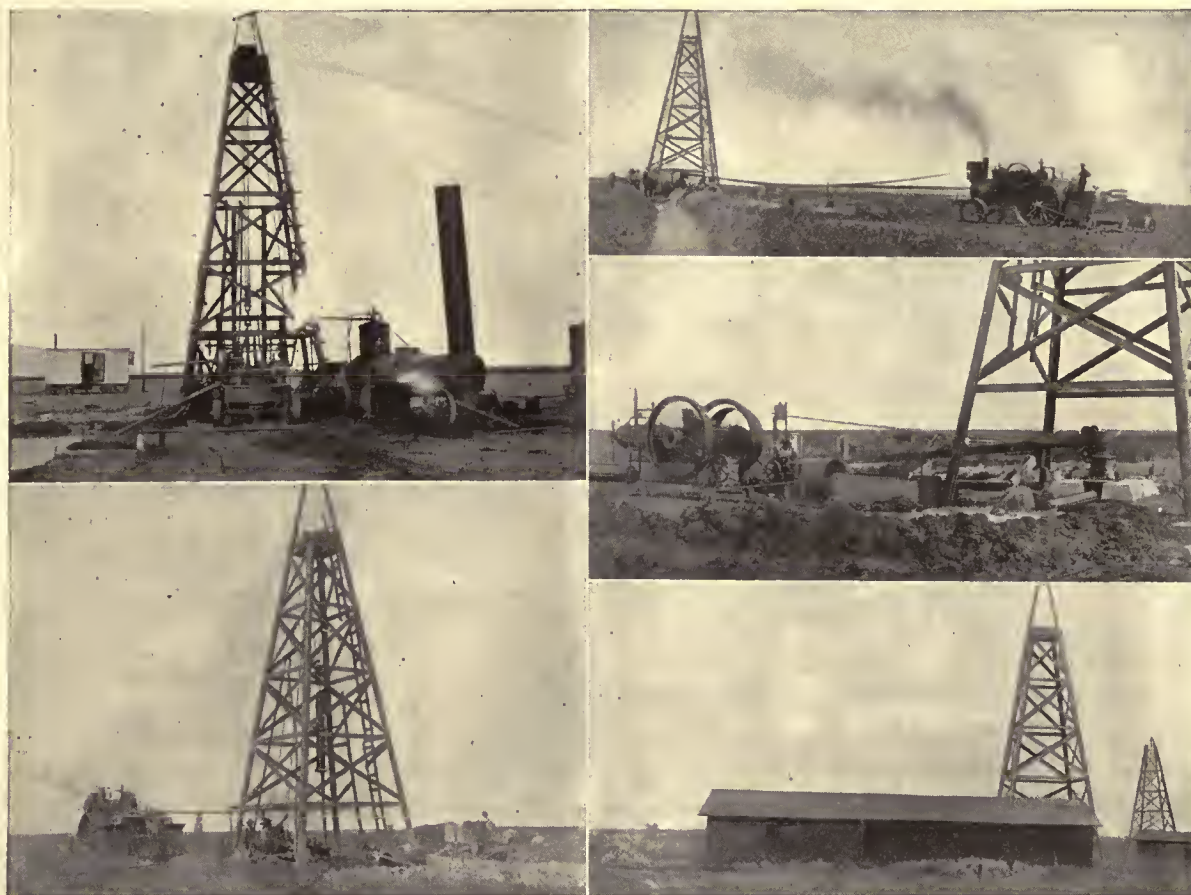
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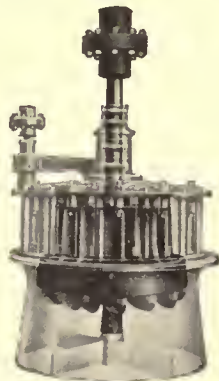
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Thirty-First Year

# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, AUGUST, 1916.

No. 10

## THE IRRIGATION AGE

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THE IRRIGATION ERA

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### More About Water Duty

We are in receipt of a number of letters touching on an editorial in July IRRIGATION AGE on the duty of water in irrigation. One of these is from Mr. Henry D. Tudor, counsellor-at-law, Boston, Mass. Mr. Tudor in his communication—presented in another column of this issue—states that he owns an irrigated farm of 160 acres in Southeastern Colorado, and he is therefore much interested in the subject of water duty. The gentleman says further that Professor V. M. Cone of the Colorado Experiment Station in an address at Fort Collins some years ago made the assertion that nine inches of water is enough, while John A. Widtsoe, president of the Utah Agricultural College, Logan, Utah, in Bulletin 117 gives a very interesting discussion on the duty of water, in which he says:

"The duty of water depends in part on soil conditions. The investigations that we have made make it clear that the best quantity of water to be used for the various crops ordinarily grown is between 10 and 20 acre inches. The best quantity lies nearer, probably, the former figure. It is doubtful if more than two feet of water are ever justifiable, especially where the rainfall is between 12 and 15 inches. Twelve inches would undoubtedly be better."

Mr. Tudor goes on to say that Colorado, being one of the earliest parts irrigated, shows more plainly than many other districts the ill effects of

over-irrigation as thousands of acres in old irrigated sections of that state have been abandoned because of water logging of the land, and this is especially true of the San Luis Valley, where there are many abandoned farms that would be producing crops today were it not for this condition.

This subject is of such great importance that we are producing in this issue an article by Mr. Granville Lowther, North Yakima, Washington, on "Important Questions for Irrigators," wherein this subject is covered in a comprehensive and interesting manner.

The gist of the whole question is to learn the minimum of water to produce the maximum crop and thereby avoid water logging either your land or that of your neighbor, the latter being in a sense the greater crime of the two.

### Washington Water Code Conference

Sometime ago Mr. W. M. Street, of Seattle sent a letter to ten of the leading men of his city, who are in one way or another interested in irrigation, asking them to meet at the Arctic Club of that city for luncheon, and the call stated that the purpose of the meeting was to start a movement to frame a water code for the State of Washington.

These men appointed a committee of five, of which Mr. Street was a member, whose duty was to "start something." This committee interviewed the Governor, with the result that he sent out over

200 invitations which covered individuals interested in irrigation districts and projects, hydro-electric companies, power companies, commercial organizations, labor unions, clearing house associations, county officials and others, asking that they send delegates to Tacoma on July 11th and 12th for the purpose of framing a water code and further to agree on some line of procedure which would establish recognition before the next session of the legislature, which convenes in January, 1917.

Washington's sister States, Oregon and Idaho, with many other States in the arid belt, have revised their water laws in protection of irrigation interests, but the great State of Washington is still straddling the fence.

The Constitution of Washington provides for appropriations, but the Supreme Court of the state has taken at times a decided stand in favor of riparian rights, and it is the opinion of those who are well acquainted with the situation that relief must and may only be obtained by the adoption of a new code.

Interest is peculiarly divided in the State of Washington. The Cascade Mountain range, running North and South, makes Eastern and Western Washington as different in climatic and other conditions as England and Australia.

On the West side of the range the water power interests are strongly intrenched.

The Great Northern Railroad has a stupendous, potential hydroelectric plant at Lake Chelan, not to mention a number of others.

At each session of the legislature the people who are working for a new water code have met with opposition from other interests and it was decided that the wise thing to do would be to begin right and allow sufficient time to shape public sentiment before the legislative body meets.

The meeting at Tacoma brought out the old-time opposition, and not much of value was accomplished. It is stated that irrigation interests could have secured at this meeting the adoption of almost any sort of a resolution recommending a code most favorable to their interests, but as the object of the conference was to get together and arrange matters so that the old-time fight would not be encountered at the time of the meeting of the legislature, it was suggested that some sort of a compromise be effected which would be fair to both sides.

The result was an adjournment, and another meeting will be held at North Yakima in November of this year, at a date to be set by the permanent chairman. Much work is necessary to accomplish the aims of the irrigation group, but by harmonious and concerted action the desired result may be secured.

### **American Federation Of Water Users**

The editor of IRRIGATION AGE will start on August 12th for a general trip to all of the Federal Irrigation projects, with the object in view of inducing all the Water Users' Associations to join the American Federation of Water Users.

The plan of establishing a permanent irrigation congress to be held annually at either Salt Lake City or Ogden, Utah, or Boise, Idaho, will be thoroughly canvassed with the officers of the various Water Users Associations, and it is now planned to hold the first Congress in January, 1917.

This trip will occupy three or four months, and the following projects will be visited: The Carlsbad, Hondo and Elephant Butte projects in New Mexico; Salt River, Arizona, Yuma, Arizona and California; Uncompahgre and Grand Valley projects in Colorado; Garden City, Kansas; Strawberry Valley, Utah; Salt River, Arizona, Yuma, Arizona, and California; and the Klamath Lake project in Oregon—California, Minnedoka and Payette—Boise, Idaho; Umatilla, Oregon; Sunnyside, Tieton and Okanogan, Washington; the St. Mary, Blackfeet, Sun River, Milk River, Lower Yellowstone and Huntley projects in Oregon; the Williston and Buford-Trenton, North Dakota; Belle Fourche, South Dakota; North Platte, Nebraska—Wyoming, Shoshone and Pathfinder in Wyoming.

This work will necessitate almost continuous traveling for three or four months, and owing to the widely scattered points to be reached, careful survey has been made of the entire field, so that no time may be lost or ground gone over twice.

The question of a permanent location for the Congress of Water Users and headquarters of the Federation will be determined by the attitude of the commercial interests of the three cities named.

The city that will secure the permanent headquarters will not be called upon to pay any expenses beyond the hall rent for annual meeting of Congress, entertainment of delegates, and a small sum to cover stenographer or assistant secretary expenses during the time that publicity work is being done for the congress from year to year.

Unlike the old-time Irrigation Congress, there will be no "pork barrel," as none of the officers will be allowed, under the constitution and by-laws, to draw a salary.

A full report of progress in this work will appear regularly in IRRIGATION AGE.

**If you wish to keep posted on the development of work along the line of the Water Users' Federation, send \$1.00 for one year's subscription to Irrigation Age.**



# IMPORTANT QUESTIONS FOR IRRIGATORS

## GRANVILLE LOWTHER\*



Granville Lowther

If men are not as honest in the use of water as in the use of other things of value, the reason is to be found in the conditions under which they live rather than in the natural dishonesty of the men themselves. After considerable observation in traveling throughout the orchard sections of the Northwest. I

am convinced that men are not as careful in the use of water which they have no right to use, as they are in the use of other commodities. I can select almost any community of citizens in the irrigated districts of the Northwest, and believe that my property such as horses, hogs, farm machinery, household goods, or anything else would be entirely safe from any dishonest use by the people of that community, and yet I think I can find in those neighborhoods, orchard districts and other farming industries where the rule is that people take water ordinarily which they know belongs to others. I think I have seen one community where, if all the men who "steal" water or "hog" water were in jail, there would not be enough left in the orchards to spray for codling moth. Now if this be true, it is on account of the conditions, not on account of the men themselves, and these conditions ought to be remedied. One of the conditions is the difficulty in measuring water.

### Different Units of Measurement

I know of nothing in common use except water, with different units of measurement. In weights and measures there are customary standards generally fixed by law, such as the foot, the pound, the bushel, the barrel, etc. In land measure we regard the rod as the unit, with feet and inches as fractions. We have no such unit in the measurements of water. For instance, in some parts of the country the miner's inch is the standard, in others the acre foot, and in others still the estimates are made in terms of depth in inches over the surface of the land. Now it is so difficult to translate one of these units into the terms of another that very few persons can get the equivalent.

### Examples of Different Standards

I will give as an illustration, some examples with which I am familiar, although my observation leads me to the conclusion that throughout the Northwest, much of the same differences prevail: Naches and Cowichie Ditch, one miner's inch per acre; Yakima Valley Canal Co., one inch per acre, measured over a wier. The Selah Ditch Co. gives two-fifths inches per acre, measured under six inches of pressure. The Terrace Heights Company gives one-third of an inch per acre, measured through a meter. The Tieton, a government project, gives two and seventeen-one-hundredths

acre-feet. The Moxee Canal Co. gives one cubic foot per second for 160 acres of land. The Washington Irrigation Company, one cubic foot per second for 160 acres. The Fowler Ditch Co., one cubic foot per second for 150 acres.

The difficulty is for the average person to know what relations these different standards sustain to each other, or to the standard adopted by the government.

The miner's inch is not a uniform unit for all states. The court of Kittitas county, Washington, has defined the miner's inch as "the amount of water which will constantly flow through an opening one inch square through a plank one inch thick in the side of a box in which still water is maintained at a constant depth of four inches above the top of the opening."—Engineering News, Nov. 7, 1907.

In California the measurement is taken from the center of the opening instead of the top.

Generally throughout the Yakima Valley a miner's inch is defined as the flow of water through an inch aperture under six inches of pressure. In some cases the aperture is made two inches wide and one-half inch long instead of one inch square, and this gives less water than the inch square because there is more friction surface. A continuous flow of one miner's inch is commonly supposed to be enough to irrigate two acres. However, this depends on the characters of the soil and the character of the crop grown.

It is necessary to distinguish between the terms "miner's inch," "cubic inch" and "acre inch," as it is to distinguish between the terms "second foot," "cubic foot" and "acre foot."

The cubic foot is a cube of one foot on every side and contains 1,728 cubic inches. It also contains seven and one-half gallons.

The acre-foot is one foot deep over one acre of land.

The second-foot is a cubic foot of water discharging from a certain point in one second of time.

The "acre-foot" is a measurement of volume, while the term "second-foot" is a statement of the rate of flow. A continuous flow of one second-foot for 24 hours will cover one acre two feet deep, equal to two acre-feet.

### Water More Valuable Than Land

The land in most irrigated sections without water was worth less than five dollars per acre. The water has cost ten times that much. The land with the water on it is variously estimated at from one hundred to two hundred and fifty dollars per acre, and if it is planted to orchard and the trees are in bearing, it has been brought by means of cultivation up to a point where it has sold as high as two thousand dollars per acre. The land in an arid country is not the thing of most value; it is the water. While it is true that neither would be

\*See illustration of measuring wiers on another page.

of much value without the other, yet the land and water taken together have made this country famous for its values. But if I am deprived of water my income is shut off and I cannot live, or if I am deprived of any part of it just to that extent my income is diminished and the value of my property depreciated. Therefore, the title to water should be as inviolable as the title to land, and the division of water as accurate, if possible, as the boundaries of land, because water is our most valuable asset.

Whoever, in an irrigated section, deprives another of water with which to irrigate his land, deprives him of that which he must have in order to live. In doing this he injures the whole community by rendering the community as a whole, less productive. Therefore, the whole community should demand an equitable division.

### Some Things Irrigators Should Know

1. In the laying of pipes, any deviation from a straight line affects the flow.

2. The flow of water in a pipe, ditch or fountain, is not as strong on the sides or bottom as on the surface or center, because in coming in contact with the rough surface of the pipe, ditch or divide, there is more or less resistance, depending on the degree of roughness. Therefore, wood pipe will carry more water than concrete, and metal more than wood in proportion to the size. Further, the divides made according to the old plans where the water is not stilled before it is divided are not right, and where 90 acres, for instance, divides at one fountain, 10 acres from one opening and 80 acres at another, the ten acres should receive one-ninth of the water, but it bears half the friction and resistance. Therefore, the small irrigator, unless provision is made to compensate for that, gets less than his proportionate share.

3. Another law of hydraulics, is what engineers call "viscosity." It is that tendency of matter to resist sudden changes; and is generally spoken of in relation to semi-fluids, fluids and gases. For instance, if ten pints of molasses should be poured from the side of a can ten inches square, and I am entitled to one pint, I could not get it by measuring off one-tenth of the surface and taking what flowed through that space, because the resistance to change of the other nine-tenths would carry with the main current a part of what belonged to me. Water is not so viscous as molasses, but it is sufficiently so to make a considerable difference in favor of the large irrigator and against the small one. This can be easily demonstrated by pouring water from a large can or vessel, square at the top, marked off into one small and one large opening placed on a perfectly level base, then weighing the water flowing from each. Here again the small irrigator gets less proportionately than the large one, unless provision is made to correct it.

4. Another law is that of force or pressure. It is seen in the flow of water from a garden hose, which will often throw the water in a comparatively straight line for ten to twenty feet, before there is much breaking up or separating of the particles into lateral directions. The same is true of an irrigating pipe, in proportion to the pressure. For

instance, if a pipe enters a fountain from the west or north, there would be a greater volume of water flow toward the east or south, than on either side, unless measures were taken to correct it.

5. Another factor is the velocity of water. You can take a bucket partly filled with water and swing it with sufficient velocity so that it will pass above your head bottom side up and not a drop will spill. Here again is a factor that tends to give the small irrigator the worst of it, for he generally has a small opening on the side of the divide and the current carries some part of his proportion of water by.

### Mutual Relations

We are so situated that mutual and co-operative relations are necessary. There is no choice; for while we may own our land in severalty, the water which is more valuable than the land must be conveyed, taken and disposed of co-operatively. In a co-operative society, or where mutual relations of any kind or in any degree exist, the only hope of peace and permanent prosperity is in dealing justice to all. If one or more members of society demand special privileges to the damage of others, it is the duty of the whole community to demand justice to all. Any one who would demand more than is just, is unsuited to live in a state of civilization where mutual relations are necessary. For the very reason that irrigated sections support dense populations where co-operation in that which is their most valuable asset is imperative, these regions are developing the highest types of civilization. Our law is not the law of the sea where the big fish eat the little ones; nor of the jungle where the strong devour the weak; nor of barbarism where might makes right; nor even of isolated districts where the homes are so far apart that one is a little empire of its own and the owner is "Monarch of all he surveys"; it is the law of "equal rights to all."

### Two Ways Possible

There are two and only two ways open to us. One is the law of justice, the other of injustice. For instance, if A is not getting what he pays for and wants it, then if B objects there is friction between A and B. A says he has ten acres of land and only gets water for seven acres, therefore he loses each year the profits of three-tenths of his place, which should have been on certain years \$100 to \$500 per acre, or \$300 to \$1,500. B says if improvements are made, it will cost him 50c per acre, or \$5.00 for ten acres. Therefore, he stands opposed. After a few years A plows up his alfalfa, puts on a heavy coating of mulch and has water enough. In the meantime B's orchard has grown, the land puddled and he needs alfalfa and more water. B then wants the improvements made to which he formerly objected. Now it is A's turn to object, and he may be delighted to administer to B a dose of his own medicine. A and B come to be enemies and this enmity extends to their families and their friends. C and D, E and F, G and H, and others have experiences similar to those of A and B. This puts half of the whole community into an attitude of dislike for the other half, and as circumstances change from time to time, it eventually includes the whole community.

(Continued on page 157)



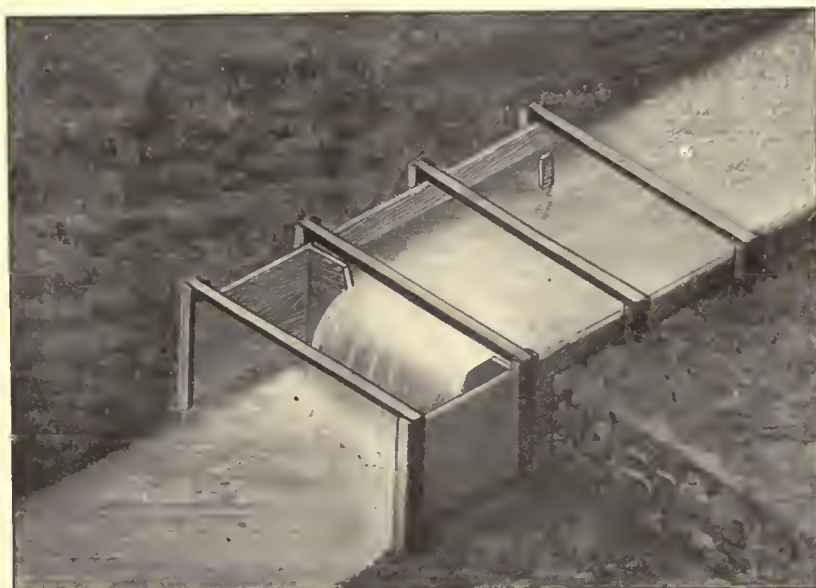
## ECONOMICAL USE OF IRRIGATION WATER

Extensive Tests in Idaho That Indicate the Most Profitable Quantities and the Best Distribution of Water for Ordinary Crops Under Average Conditions

Under conditions such as prevail in Idaho on a normal project with medium clay loam, irrigated land should be supplied with sufficient water during the season to enable each irrigated acre to retain 2 feet, according to a recent investigation of the U. S. Department of Agriculture. This applies, it is said, to at least 75 per cent of the irrigation projects in

Idaho and probably to as large a per cent of the projects in other States. In order that the land may retain the needed 2 feet of water per acre, the former should receive about  $2\frac{1}{4}$  feet on medium clay and sandy loam soils. Where the soil is porous or has a porous subsoil lying closer to the surface than 6 feet, more than this quantity of water should be delivered to the consumer, the exact quantity depending, of course, upon the porosity of the soil. Where an Idaho project is devoted one-half to grain and the other half to alfalfa or other crops, the total volume of water should be distributed something as follows: 18.7 per cent during May, 28 per cent during June, 32.8 per cent during July, 17.2 per cent during August, and 2 per cent during the first half of September. After this time the only demand for water is for live stock and domestic purposes.

These conclusions, which are based upon co-operative experiments conducted by the U. S. Department of Agriculture and the State Land Board of Idaho, are reported in a new professional paper, No. 339, of the U. S. Department of



Cipoletti Weir With Measuring Rod

Experiments show that the yield of grain on the heavier soils such as clay, clay loam, sandy loam, and fine sand, will normally increase with the supply of water until an amount varying between 1.4 and 1.8 acre feet has been applied. After this the application of more water will decrease the yield of grain, and, in many cases, the yield of straw as well. Alfalfa requires larger quantities of water, and the experiments did not reach a point at which an increased supply began to lessen the yield. If the yield alone is considered, it is difficult, it is said, to apply too much water to alfalfa, provided no more is applied at one time than the soil will promptly absorb. With both grain and alfalfa,

Agriculture, entitled "Experiments on the Economic Use of Irrigation Water in Idaho," by Don H. Bark. During the course of this investigation the water was measured upon 529 individual tracts, covering a total area of slightly over 3,600 acres. The land was used for staple crops, alfalfa, clover pasture, spring and winter grains, potatoes and orchards.

however, the amount of water that it is profitable, from a business point of view, to use depends upon the relative cost of land and of water and other local economic conditions.

With potatoes, it is found that there is a strong tendency for the yield to increase with the supply of water. The rate of increase, however, grew smaller as the quantity of



Cipoletti Weir as Used in the Field

water was increased, and on clay loam soils it probably will not be advisable to apply more than 2 or 2½ feet per acre to the crop.

The report also deals with the question of the proper quantity of water to apply at each irrigation. An unavoidable loss from evaporation invariably occurs during and immediately after irrigation, and it is therefore desirable to have no more applications during the season than are required to maintain the needed moisture content in the soil. Investigators found that from 3 to 6 acre-inches at one application is the correct quantity. Impervious soils should be so manipulated that they will absorb the smaller amount at least, while on the porous soils large irrigation heads should be used. On these porous soils very little can be accomplished with small heads of water because the water is absorbed so rapidly that it can not be forced over the field. The average size of the irrigation head over the greater part of Idaho seldom exceeds 1 to 2 second-feed. On the porous soils, the use of heads three

or four times this size, it is said, will give a much higher efficiency.

In conclusion, the report points out that the determination of the proper supply of water for an irrigation project is a very serious problem. If too little water is allotted, the yields will be small and the lands never will reach their highest possible value. On the other hand, if too much is allotted, the excess supply is almost invariably used and the irrigated lands may deteriorate rapidly through waterlogging. Moreover, the water is diverted from use elsewhere and the ultimate area of irrigated land thus reduced. In determining the amount of water to be used, other factors than the maximum yield must also be taken into consideration. The cost of the land, the cost of the water, and the value of the crops produced are all important considerations. There are but few cases in which the increase in yield is proportionate to the quantity of water used.

## ENGINEERING AND CONSTRUCTION FOR IRRIGATION DISTRICT

L. M. Rice, C. E.

The modern engineer is a public service institution. His abilities and genius should be exerted at all times in such a way as to be of the greatest good to the greatest number. In irrigation works he can do this to a better advantage when working with the district organization. The district organization being a municipal one, in which he is serving the people of the district. The mere planning and building the head gates, canals, ditches and flumes of an irrigation plant, is not all the duties that should be performed by the engineer under the district plan. No plant is properly planned that does not provide ways by means of which the capital invested receives a fair rate of interest, and that from the output of the plant. He should go beyond the mere building of structures through which water is transmitted. He must look to the foundation upon which the whole structure is builded. He must study and understand every problem connected with the carrying of an irrigation problem to a successful conclusion. The problems of construction are not solved until such time as he is able to lay the foundation upon which to build a paying institution. In order to do this, he must understand the human problem involved. No one is in a better position to study these problems than the engineer. It is, therefore, up to him to see that the man on the land is firmly rooted to the soil. This can only be done by making him happy and contented; through giving him loads that he can bear easily. With a happy, contented people on the land, the foundation for a successful irrigation project is laid. How best to plan and lay this foundation is the principal problem to solve. The irrigation district is designed to give to the people the necessary irrigation works, at the least possible cost, leaving no room for the promoter's profits, or large banker's discounts. This will prove to be a large burden taken from the shoulders of the man on the land. There are instances where this burden has been as much as the cost of the project. The projects should be financed in such a way as to give the man on the land a chance to pay for his water rights and other charges through his returns

received from the production of his land. It is further necessary that we devise some scheme by means of which we can induce men with comparatively small capital to go upon the land. The development of wild lands, be it Puget forest or sage brush in eastern Oregon, is the work of a hardy earnest working man. It requires several years to bring wild lands to the producing stage. Heretofore, the impression has been that all that was necessary in order to make an irrigation project successful, was to get water upon the land; that the profit from irrigated lands was so great that immediately people would come from every direction and pay fabulous prices for same. Through experience, we have discovered that this is not always true. However, almost any irrigation project will succeed, provided always your lands are properly settled. Each man going upon the land should have sufficient time within which to put his land under cultivation before any large payments are asked of him. The engineer should see that every detail of construction has been carried out, that there is nothing left in the shape of construction work for the man on the land to do. In making his estimate he should not only estimate the cost of the main canals and main laterals, but he should estimate the cost of all laterals that are necessary for the development of each piece of land, as well as the cost necessary for the leveling of these lands so that they may be irrigated. The clearing of the lands on an irrigation project, removing the stones and the leveling of the same, in order that water may be placed upon it, is just as much construction work as the building of the head works, and no project is complete until such time as the man upon the land is able to produce crops, and through the sale of same, is able to live and pay the necessary charge levied against him. Nothing should be left to him other than work incidental to farm operation. All other costs should be included in the bond issue and should be carried as a construction charge the same as any other portion of the work.

In Washington we have a district law, which



enables an irrigation district to issue bonds for forty years, in sufficient quantity to build the works, to pay interest on the bond during the construction period and four years thereafter. It also provides for a sinking fund of 2 per cent to be established after the eleventh year, which invested at 4 per cent interest, compounded each year, will, at the end of forty years, retire the entire bond issue.

We believe that this is a step forward in the irrigation district laws. Our old district laws were designed for small projects, such as were usually well along towards settlement before the district was formed and one that usually could be completed within the period of one year. They made no provision whatever, for the payment of interest out of capital during the construction period, thus requiring that assessments be levied upon the landholder prior to the time of receiving water. In most instances these charges are so great that it is impossible for the landowners to make their first payments from the product of their lands. The consequence is that a great many district projects throughout the country have, in the last few years, gotten into financial difficulties.

Land speculation is a curse, that seems inherently attendant upon every irrigation project. Wherever the development of an arid tract has been decided upon, there the speculator is in evidence. At normal prices he quietly acquires control of the most eligible portions; then begins a campaign of inflation. He adroitly manipulates this into wild exaggeration of values which at its zenith of feverish excitement, he deftly unloads, en masse, upon incipient boomers. Adding liberally to these fictitious values, these retail boosters proceed to parcel out to the home-builder. They take all his cash, and a mortgage which is promptly discounted and sold, and which ultimately is foreclosed. The discouraged and bankrupt farmer sincerely believes that irrigation is a failure, and that farming is a fizzle. Rarely does he ascribe failure to the true cause. Rarely does he realize that he was buncoed in his original purchase.

This deplorable condition is met on every project. No man has a moral right, and should have no legal right to hold out of use, any portion of a body of land for the reclamation of which great community outlay has been made. He should not be permitted to share in profits he never helped to create. The enhanced values arising from the development of his neighbor's contiguous property, should not be legally his, any more than they are morally his. The unearned increment belongs rightfully to those who made it.

I believe this great evil can be cured; at least in all organized irrigation districts. Such districts are public-service municipalities, with power of eminent domain. That power should be invoked, and any lands owned in the district and held without use and for speculative purposes, should be condemned and sold at a reasonable price to those only who will cultivate them.

Government—federal, state and county—invites its citizens to occupy the public lands and convert them into homes. Publicity funds in large amounts are annually expended with a view of increasing the rural population. But by some strange mental strabismus, as soon as the country homeseeker has

moved upon and commenced the development of his ranch, there begins at once an oppressive system of taxation destructive of incentive, courage and hope. It is both morally and legally wrong to require a settler to pay a tax upon property he does not own. The chief item of value on the irrigated homestead is its water right, and no title thereto passes to the settler, until he shall have made full payment therefor. Indeed, even the settler's land is conveyed in trust until all water obligations shall have been extinguished. Under this aspect of his status, the statutory fiat to pay taxes is all he can, of a certainty, lay positive claim to. Modern practice really places double taxes upon the settler's water right; for the ditch people own this water-right, and pay taxes on what they own; and the settler pays taxes again on the same water right.

Justice demands suitable relief against this species of public extortion. Such relief should be provided by placing the project settler in the same category with other taxpayers, viz.: assess his land at first at no higher valuation per acre than neighboring arid land is assessed outside of the project.

Do not limit the man on the land to any specific area, but let him have all the land he can cultivate. Make conditions favorable for his highest productive power. Encourage the use of modern farm implements by imposing no restrictions upon the farm unit other than good tillage. Encourage him in growing a wide diversity of such products as flourish in his latitude, not forgetting that conspicuous in such diversity, there should be a crop of new farmers grown on the soil, and firmly attached thereto by the ties of childhood and home.

Another item connected with the planning of an irrigation project, and a most important one, is the duty of water. The tendency has been heretofore for engineers to provide more water than is necessary. It certainly looks like a waste of energy and money to go to the expense of carrying water into a district, and then later on be compelled to build drainage works to take it out. In most of our arid regions we have considerable precipitation, and in a great many instances all that is required is a few more inches than Nature gives, in order that crops may be grown bountifully. The mistake of providing excess water is the most natural one when we come to consider the fact that in our early attempts at irrigation throughout the west, we invariably picked the lands easiest to put water on. These lands lie along streams, and are sandy and gravelly in nature, and in most instances are underlaid with wash gravel. These soils will absorb a great quantity of water. I have reports of lands in certain projects in the west that have been known to take as much as 42 acre-feet of water per year. This, of course, is absurd, and lands that require such a quantity of water should never be irrigated at all. There is no dearth of land in the western states that should be watered; there is, however, a great shortage of water and the object of the engineer should be to secure the greatest possible production per acre foot of water.

I have oftentimes said, and still say, that could we have reversed our mode of operation in the west, that is, could it have been possible for us to irrigate our higher lands to begin with, leaving those low-lying lands above mentioned without water or

to receive such water as may be drained from projects above, we would have accomplished a great deal more than we will be able to accomplish with the system started as it has been. Invariably, our higher lands are of a more compact soil, receive a greater amount of precipitation and retain the moisture better. The consequence is that the amount of water necessary to produce crops upon these lands, in addition to that which Nature has already given them, is of relatively small quantity to that which is necessary to grow crops upon the lower lands.

Good results can be secured on the basaltic soils of eastern Washington and Oregon, where there is a sufficient depth of soil free from coarse sand and gravel, through winter irrigation. These soils will hold about 30 per cent of their weight in capillary water. That is, each foot in depth will hold in suspension and retain  $4\frac{1}{8}$  inches of water. The writer has been successful in putting 20 inches of water in five feet of soil, and produced a splendid apple crop without further irrigation. The water was put in the soil during the winter and spring months. No irrigating was done after April. Through the practice of winter irrigation and the storage of water in the soil, large expenditures for reservoirs will be done away with; at the same time enables the farmer to do his irrigating at a time when he is not busy at other farm work. He will be able to spend the summer months cultivating crops instead of drowning them.

We, as engineers, must devote our time and attention to the conserving of our waters, to securing to the people the greatest amount of production with the least amount of water, and address ourselves at all times to educating the farmer that it is not necessary to drown his land in order to raise crops. Cultivation under irrigation counts for as much as it does any place else. As a matter of fact, all that we require in most instances is, to adopt dry farming methods, with a little irrigation in order to bring under cultivation thousands of acres of land that has not at the present time been considered.

The financing of irrigation projects throughout the west has been carried on through such a variety of methods, that we have at the present time upon our markets, such a varied form of irrigation bonds that it is impossible for anyone to understand exactly what an irrigation bond means. We have, as an instance, a private corporate bond, which is secured by private contracts upon lands. We have mutual water bonds; we have Cary Act bonds, and the district bonds from several states, no two lots of which are alike. The consequence is, at any time, that you undertake to float an irrigation bond, if the banker will listen to you at all, it becomes necessary for you to explain the exact kind of a bond you propose to sell. This explanation sometimes takes weeks. What we should work for at the present time is to secure some way by means of which each and every irrigation project throughout the west shall issue a uniform bond. This can best be done through passage by each state of a uniform irrigation district law, so that every security issued on an irrigation project, would be exactly the same kind of security as issued on any other irrigation project, so that financiers may know what an irrigation bond is. The irrigation district in all of our states is a municipal organization,

but what is required more than anything else is a uniform method of issuing these bonds and a uniform method of paying the same.

A bill has been introduced in the U. S. Senate by Senator W. L. Jones, which has for its main object the guaranteeing of interest on district bonds by the United States government. It is believed that under the workings of this law the Secretary of the Interior will insist that each state, wishing to take advantage of it, pass a district law which will be uniform in its operation. It is believed that within a short time after this bill is passed that such laws will be passed by the states that will enable them to issue the kind of security that will be known and understood in the money markets of the world, thus enabling us to develop the West more rapidly than has been done before.

I am glad to see that Oregon has organized this Congress; a congress similar to your's is needed in every state in the West. If we are to succeed in developing this great country, it is necessary that all of us, each and every one of us, do our little mite towards bringing about this thing. It can only be done through organization. It can only be done through the united efforts of every state and of every man in every state. It is the great work of the West. If our cities are to retain their present prosperity, it is necessary that our arid lands be developed. Whenever the time comes that all of our landed resources of the West are under cultivation, and we have a man upon every piece of land that is capable of producing a living for him, we will no longer hear the cry of "More Factories" in the city; no longer will our Chambers of Commerce have to be continually advocating the subsidizing of manufacturing industries in order to get them to come because through the development of our lands, we will create a market for the thing that the manufacturers produce; and when that time comes, the factories will come without the necessity of subsidizing them.

Most all legislation heretofore has been for the purpose of assisting the commercial man, the man who does business with the article that is produced by the farmer. We hear today of Congress debating the question of government construction and operation of steamships on one side and government subsidy for steamships on the other. We have a banking system that is designed wholly for the commercial man. We have had a protective tariff for years, which is designed for the purpose of building up the manufacturers. We have had railroads subsidized by land grants and government guarantee of interest on bonds. Each year there is an appropriation made by Congress for the purpose of improving our rivers and harbors. We have lately completed the great Panama canal for the purpose of aiding commerce; together with constant efforts being put forth by Congress in order to forward commerce in different ways.

Without the farmer and the things produced by him, there would be little use for the above subsidized institutions. We have had but little legislation up to this time that has for its aim the development of our landed resources, and putting a man upon the land in such shape that he may be able to produce the necessities of life at the lowest possible cost. I advise engineers to look to the foundation of the completed project; the man who does the paying without that be firm and sound, it matters not how perfect a superstructure you may build, the project falls a financial wreck to fill a bankrupt grave, as so many others have.



## Letters from Our Readers

Boston, Mass., July 20, 1916.

To the Editor of the IRRIGATION AGE,  
30 North Dearborn Street,  
Chicago, Ill.

Dear Sir:

I read in your July number an article on the Duty of Water in Irrigation with some interest.

I own an irrigated ranch of about 160 acres in south-eastern Colorado and have been for some time interested in the duty of water.

Prof. V. M. Cone of the Colorado Experiment Station, in an address at Fort Collins some years ago, made a statement that nine inches of water was enough.

John A. Widtsoe, president of the Utah Agricultural College, Logan, Utah, in Bulletin 117, gives a very interesting discussion on the duty of water, in which he says: "The duty of water depends in part on soil conditions.

"The investigations that we have made, and others have made elsewhere, make it clear that the best quantity of water to be used for the various crops ordinarily grown is between ten and twenty-acre inches. The best quantity lies nearer probably the former figure. It is doubtful if more than two feet of water is ever justifiable, especially when the rainfall is between twelve and fifteen inches. Twelve inches would undoubtedly be better."

This bulletin also contains a series of very careful experiments regarding the use of water, and his conclusions are based upon the actual working conditions, covering a number of different crops which are commonly grown in arid regions. You will see that his conclusions bear out what Professor Cone of Colorado says.

Colorado is one of the earliest irrigation sections and contains more irrigated lands than elsewhere. The overuse of water there is more clearly demonstrated than almost anywhere else. Thousands and thousands of acres in old irrigated sections have been abandoned because of waterlogging of the land through overirrigation, and you can go through the San Luis valley today and see abandoned farms by the wholesale, due entirely to this cause.

The true facts seem to be that farmers undertake to make the overuse of water take the place of cultivation. In some cases this is extremely successful for a few years and then the land is ruined.

There have been some interesting experiments made in connection with alfalfa growing and the use of water. It appears that up to twenty inches of water during the growing season a crop of alfalfa is constantly increasing; beyond twenty inches the results show a decrease until one gets up to a duty of three feet, and from three to four feet there was a small increase in the crop, but beyond that, none whatever.

The man who is using four feet of water on his alfalfa is gaining, in a slight addition to his crop, at the expense of his land in years to come.

From my own experience, I would not use over twenty-four inches of water for alfalfa in any event. The results of irrigating above twelve inches of water for the ordinary grain crop grown in our section show a large decrease in the crop, usually, one-half of normal.

Settlers under the old irrigation districts have learned the danger of overuse of water. The new settlers cannot get enough of it, and the results already show in the government reclamation projects that settlers are overirrigating to such an extent that now at the end of only a few years of the use of the land it becomes necessary to put in a drainage system in order to let the land grow anything.

It seems to me that this question is so important to any one operating an irrigated farm that it should be brought to the attention of the farmers and your readers as forcibly as possible.

Very truly yours,

HENRY D. TUDOR.

Seattle, Wash., July 19, 1916.

Mr. D. H. Anderson,  
Editor IRRIGATION AGE,  
Chicago, Ill.

My Dear Sir:

In case your attention has not been called to it, I believe some facts regarding the recent state Water Code Conference, held in Tacoma, will be of interest to you. There is a good deal connected with it, but I shall touch the whole subject only in high places.

Two months ago I wrote a note to ten of the leading men in Seattle, who were in one way or another interested in irrigation, asking them to meet for a luncheon at the Arctic Club, which I had arranged, and the purposes of which were to start a movement for the securing of a water code for the state of Washington. These men appointed a committee of five, of which I chanced to be a member, whose duty it was to "start something." We immediately interviewed the governor, with the result that he sent out over 200 invitations, including irrigation districts and projects, hydro-electric companies, power companies, commercial organizations, labor unions, clearing house associations, certain county officials, etc., asking that they send delegates to Tacoma on July 11th and 12th in order that we might frame a water code and be agreed upon some line of procedure in advance of the coming legislature in January.

You perhaps know that where our sister states of Oregon and Idaho, and most of the other arid states, have revised their water laws in protection of irrigation interests, the state of Washington is still straddling the fence. Our constitution provides for appropriations, but our Supreme Court has made some strong resolutions in favor of riparian rights. The whole situation needs attention, and for the past twelve years relief has been needed from legislation.

Interest is more diversified in the state of Washington than any other arid state. The Cascade Mountain range, running north and south, makes eastern Washington as different as England is from Australia. Power predominates on the west slope and irrigation is king, or ought to be king, in eastern Washington. On the west side Stone & Webster are deeply entrenched. The Great Northern Railroad has a stupendous, potential, hydro-electric plant at Lake Chelan, not to mention a number of others. At each successive legislature the irrigation people have met the same old story, so that this year we thought it wise to begin in time and to make an effort to see to it that the water code was a part of the legislature program in advance of the election of the legislators, to say nothing of the coming together of the legislature.

At Tacoma we met the same old faces which have confronted us at various legislatures, with the result that nothing definite was accomplished. It is true that irrigation interests there could have secured the adoption of any sort of a resolution recommending a code most favorable to irrigation, but the object of this conference was to get together and arrange matters so that there would not be the same fight when the legislature meets in 1917. Therefore, there was much talk of compromise. The final result, however, was that the conference was adjourned to meet again in North Yakima in November, at a date to be set by the permanent chairman. The chairman also is to appoint a committee of seven, representing the various and sundry interests which are affected, and this committee, it is hoped, will be able to submit to the Yakima meeting a code which will be satisfactory to all concerned. Whatever passes this meeting will in all probability pass the legislature also.

The Associated Press gave considerable publicity to this conference, but what I have said I hope will at least supplement the information you have on the subject.

Very truly yours,

H. M. STREET.

SEND \$1.00 FOR THE IRRIGATION AGE  
ONE YEAR AND THE PRIMER OF  
IRRIGATION.

## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### California

The contract for furnishing steel pipe for the irrigation system in San Fernando Water District No. 3 has been awarded to the following Los Angeles concerns: The Baker Iron Works, the Llewellyn Iron Works, the Lacey Manufacturing Company, the Western Pipe and Steel Company and the Los Angeles Manufacturing Company. The total cost of the pipe will be \$714,000.

A plan for the utilization of the waters of Lake Almanor for the irrigation of 20,000 acres lying immediately southwest of Oroville has recently been presented by S. J. Norris. The land proposed to be irrigated would include the rich Central House district, the territory between Central House and Palerino and the Honcut section.

The assessment roll in Anderson-Cottonwood irrigation district of California shows land values of \$1,500,000 on 32,500 acres to protect a bond issue of \$480,000, voted recently to construct an irrigation project.

The Oakdale (Calif.) irrigation district has sold its \$400,000 bonds issue to the E. J. Knight Company of Los Angeles, on a bid of \$90.25.

The Central Water Users' Association, recently formed to devise ways and means of untangling the muddle into which the affairs of the Sacramento Valley Irrigation Company of California have passed, has appointed a committee of three to take up the proposal of O. L. Raper to solve the situation by turning the project over to the United States Government. Under Raper's plans the irrigation system would become a unit under the Iron Canyon Project.

### Colorado

B. H. Tallmadge of Pueblo has recently signed a contract with the Twin Lakes Land and Water Company to dispose of 12,000 acres of land, under irrigation, in the Ordway and Olney Springs district, east of Pueblo. The land will be disposed of in tracts averaging forty acres each. The company will build modern homes and place the tracts in readiness for the coming of the home-seekers.

Through the work of a former Clinton, Iowa, man, Daniel B. Ellis, one of the largest irrigation projects ever attempted in southern Colorado has been completed at Durango on the New Mexican border line.

The plan provides for the stretching of a great irrigation flume from a dam above Durango through the heart of the rich San Juan valley. Back of the project is the Kutz Amaigo Ditch Company, which control a nine-mile tap from the main dam at the present time.

It is said that 20,000 acres of rich

agricultural land will be opened up for settlement and cultivation as a result of the new plan.

Work has been begun on the Omar project in Otero county to irrigate 20,000 acres of good land in Pueblo, Otero and Las Animas counties by the end of next year at a cost of \$400,000. There has been a consolidation of the Omar and Apishapa irrigation districts. Both systems have water rights from the Apishapa river.

It is expected that water will be put on 1,000 acres this year, and on several thousand acres next. Fifty thousand dollars will be spent on the scheme, and after irrigation has been established the owner intends to devote the land entirely to cattle raising, growing the fodder on the land with which to support the stock.

### Idaho

Through a government appropriation having been made for the survey of the Black Canyon project, which lies adjacent to Middleton, the general belief is prevalent among the settlers of the project that the government has decided to add the project to the Boise-Payette project, and that water for its irrigation will be furnished from the Arrowrock reservoir and from the Payette river. The project has an area of approximately 100,000 acres.

Announcement has been made by W. R. Heyde, field engineer for the Wickahoney Land and Water Company, that work would probably be begun in the near future on two irrigation projects, one in the Sagehen basin, near Ola, and the other in the Paddock valley, above the Little Willow creek irrigation district. The Sagehen project contemplates the irrigation of between 4,000 and 5,000 acres and will involve an expenditure of about \$150,000. The Paddock valley project will put water on about 6,500 acres. An estimate of its probable cost has not yet been made.

At a recent meeting of the state land board, the Blaine County Irrigation Company was directed to show cause on or before August 15th why its contract with the state should not be canceled and suit brought on its bond for non-compliance with its contract. This action on the part of the board followed the reading of a petition signed by numerous settlers on the project, who are protesting against existing conditions.

### Montana

The Interior Department has awarded a contract to the Three Forks Portland Cement Company to furnish 18,000 barrels of cement for the Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary's Storage and Sun River projects. The contract price is \$1.90 a barrel, delivery to be made at Trident.

M. L. Morris, a representative of the engineering firm of the Gerharz-Jacquet Engineering Company of Helena, has been in the vicinity of Ft. Benton for the purpose of looking over the country in the Teton river and Marias river regions, with a view of determining the extent of lands capable of irrigation by means of electric power stations. Considerable of the lands in the low bottoms of both rivers have been irrigated for years by means of current wheels and other devices. Most of these devices have proved inadequate and at best only temporary affairs, and it is believed that with more permanent power stations big returns will be realized through the irrigation of the rich lands along these rivers.

Ferris & Hardgrove, investment bankers, of Spokane, have announced the purchase of \$45,000 worth of Flathead bonds of the Ashley Irrigation district, situated near Kalispell. The bonds, which fall due \$2,500 each year from 1920 to 1939, bear 6 per cent interest and are in denominations of \$100.

"The Ashley municipal irrigation district was organized over six years ago," said J. E. Ferris recently, "and this bond issue was brought out to cover the cost of taking over and adding to an old and successful irrigation system which has been in operation for many years.

"The district, which begins almost at the city limits of Kalispell, includes 1,700 acres, practically all of which is in a high state of cultivation. It is estimated that there are about 350 dairy cattle in the district and there are a large number of excellent homes."

Ferris & Hardgrove report an advance sale of \$20,000 worth of these bonds.

The Musselshell Valley Irrigation district in Montana has been dissolved by an order of the district court, granted on petition of a number of the water users in the east end of the district. The district, which was created in June, 1913, was a cause of dissension since its creation. The proposed irrigation project extended from Barber on the west to Melstone on the east. The owners of the irritable lands on the east end of the proposed project maintained that they had ample water for their needs and did not wish to be taxed for the building of the proposed storage reservoir at Barber. Most of them paid the taxes levied last year for this purpose, under protest.

The Reclamation Service is asking for proposals for construction of about ten miles of laterals and appurtenant structures, in connection with the Flathead irrigation project, Montana. The work involves about 43,000 cubic yards of excavation, 140 cubic

(Continued on page 157)



(Continued from page 150)

Again here is a certain section of the community affected unfavorably by an inequitable distribution. To make it right, new pipes must be laid. However, a certain other section objects because for the time being their pipes are all right. Section No. 1 argues that we helped you build your pipes, now you ought to help us build ours. Section No. 2 argues that times are too hard. But the answer comes, "If times are hard for those who get water enough, how much more so for those who do not get enough?" After a time the lines are built, because they must be, even if individuals have to bear the expenses alone. But bitterness is engendered. Later the pipes under No. 2 lateral are decayed and must be replaced. The people under lateral No. 1 remember how they were mistreated and retaliate. Such a course tends to make every one distrust every one, every one dislike every one, every one thinks and talks disparagingly of every one, and if we wanted to manufacture a little Hell, I know of no means by which we could do it more efficiently.

#### Leads to Lawlessness

I saw a man last summer working suspiciously

near one of the divides. I said to him, "What are you doing here?" He said, "I am stealing water." "Do you have to do that?" I said to him. He replied, "Look at my orchard and see." I went with him through the orchard and was convinced that his contention was right, that he was being greatly damaged for lack of water. I went away regretting the conditions which made it necessary, or which made it seem to be necessary, for an honorable man to act in that manner. But it is a sense of justice which finds expression in the substratum of human nature, and which leads to self-protection where society does not furnish protection. It is that same law which causes society to justify a man to fight in self-defense where the law does not protect him. It finds expression in a larger way in mob violence where laws are not enforced. It leads to anarchy where governments are oppressive. But anarchy is a condition where every man is his own lawyer, his own judge, and takes matters into his own hands to obtain what he thinks just, by force, subterfuge, deception or any other way which he finds possible. It is only possible to live peaceably without law under conditions where all the members of society are intelligent.

(Continued from page 156)

yards of concrete, 430 square yards of paving, the placing of about 9,800 pounds of reinforcing steel, and the placing in wooden structures of about 32,000 feet, B. M., of lumber. The work is situated on the east bank of the Flathead river from one to seven miles northeast of Dixon. The bids will be opened at the office of the U. S. Reclamation Service at St. Ignatius, Mont., October 12.

#### New Mexico

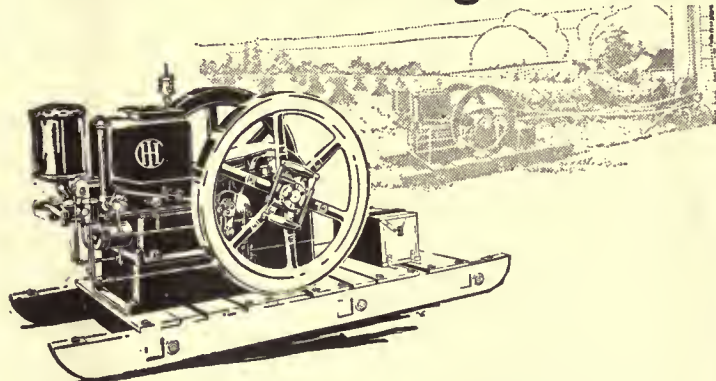
A correspondent from Springer writes that a new agricultural district has been started in that vicinity very recently. Over forty farmers have moved onto government land southwest of this city and are making preparations to cultivate and improve the lands. Most of the lands are included under the district which was segregated for irrigation by a company which planned to develop the lands under the Lake Charette project. Up to this time there has been but little work of actual construction completed by the company and it is thought that within a short time the government will throw the land open to settlement under the homestead laws.

The Water Ladder Irrigation Company, of Farmington, filed articles of incorporation with the state corporation commission recently, with an authorized capital of \$300,000, of which \$250,000 has been paid in. The incorporators are T. L. Loftus, Volney Ervin, Farmington, N. M.; Augustin Morrell, Charlie R. Stedman, Fred E. Coe, Denver, Colo. Frank A. Burdick is named as the statutory agent for the company. The company will engage in a general irrigation business as well as manufacture pumps.

#### Texas

Plans for irrigating 300 acres of land near Waco, Tex., on the Brazos  
(Continued on page 158)

## A Check on Engine Cost



**M**ANY people still seem to think that the less they pay for an engine the more they get for their money. There are 6-H. P. farm engines on the market ranging in price from about \$100.00 to \$250.00. Some men say, "6-H. P. is 6-H. P. If I can buy 6-H. P. for a hundred dollars, why should I pay more?"

One reason is that the higher priced engine is actually the cheaper, that is, it gives more value for the money invested, because of its greater length of service.

Take **Titan** engines for example. We can show any number of instances where **Titan** engines have done heavy work for twelve years and are still in everyday use. Does anyone who reads this know of a "cheap" engine that has lasted five years on any kind of work? Supposing the cheap engine lasted five years, how many such engines would a farmer have to buy to get twelve years' service? At least three, wouldn't he? Does a **Titan** engine cost three times as much as a cheap engine? Hardly. There is a real dollars and cents saving then in buying a **Titan** engine, to say nothing of the priceless satisfaction of having an engine that is **always there** whenever you need its power. Think that over.

We can make it easy for you to get the most value for your engine money. Write us at the address below.

**International Harvester Company of America**

(Incorporated)

**CHICAGO**

**USA**

Champion Deering McCormick Milwaukee Osborne Plano





(Continued from page 157)  
are being developed by Dr. J. J. Dean. The land will be divided into five and ten acre tracts and leased to truck farmers. Irrigation will be done from wells, pumps being driven by electricity.

One of the largest private irrigation systems in the United States has just passed into the hands of John T. Beamer of Chicago and associates. The transaction involved the sale by the American-Rio Grande Land Irrigation Company, near Mercedes, Tex., of its large pumping plant, canal and ditch system and 100,000 acres of land. The consideration was \$3,500,000. It is reported that a cash payment of \$1,000,000 was made by Mr. Beamer. The American-Rio Grande Land & Irrigation Company was organized about ten years ago by B. F. Yoakum of New York, head of the Frisco Railroad, and a number of wealthy St. Louis men.

It is the purpose of Mr. Beamer to greatly extend the canal and ditch system and to make the property a producer of various kinds of crops. The whole 100,000 acres will be brought under irrigation and cultivation.

Certified water filings have been filed with the Texas State Board of Water Engineers by W. M. Blakeslee of Austin, showing the appropriation of water from Sandello creek in Reeves county to irrigate 135 acres; A. M. Loomis of El Paso, showing appropriation of water from the Rio Grande river to irrigate 11,454 acres; Grand Falls Development Company of Grand Falls, Ward county, showing appropriation of water from the Pecos river to irrigate 30,000 acres; Walker Prod-

ucts Company of Austin, showing appropriation of water from the Colorado river to irrigate 1,027 acres.

#### Wyoming

We are informed that the Wyoming Central canal, the parent ditch of a system with which the Wyoming Central Irrigation Company intended to reclaim more than 200,000 acres in the district near Riverton, has been ac-

quired by Mrs. Nina LaPorte at creditor's sale for \$6,668. Mrs. LaPorte is willing to turn the canal over to the settlers who are dependent on it for water for the amount of her judgment, taxes and costs.

## CORN

Harvester cuts and throws in pile on harvester or windrows. Man and horse cuts and shocks equal to a Corn Binder. Sold in every state. Price only \$22.00 with fodder binder. Testimonials and catalog FREE, showing picture of Harvester. PROCESS MFG. CO., Dept. 194, Salina, Kansas.

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There are 20 discs on this machine set 4 inches apart. The construction is such that all the seed is sown at an even depth, and an equal amount of seed in every furrow.

**None of the seed is wasted, when drilled in the ground with a Superior Alfalfa and Grass Seed Drill**

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**CULTIVATION and SOWS CLOVER AT SAME TIME**

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**FREE**—A copy of "Boyd's Farmers' Alfalfa Guide," price 10c, will be mailed free to any reader of Irrigation Age who will write for the book and mention Irrigation Age.

## Here's Something New about California For You

Two parties of Eastern farmers saw California under my personal escort last fall. It was not a land-selling trip—it was solely for investigation.

We were guests of over forty local communities. Their Chambers of Commerce and Boards of Trade provided the automobiles and guides who showed us the agricultural activities in their neighborhoods.

We saw irrigated fruit farms. We saw alfalfa making large yields under irrigation. We saw diversified farming with its sure returns paying still better because of irrigation.

#### A Book of Pictures

taken on this trip is now ready for free distribution. We would like to send you a copy.

**You can prolong your active business life at least fifteen years in California. It is a country where you can farm twelve months in the year. You need not spend a large share of your earnings just to keep warm.**

Write me today. Let me help you plan your trip. Reduced fares next Spring and Summer will give you a chance to see the San Diego Exposition and agricultural sections of California at small cost. Winter tourist fares now in effect. Ask all the questions you want and say "Send Farmers' Special Book."

C. L. SEAGRAVES, Gen. Colonization Agent,  
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## Chicago Passenger Terminal, Chicago & Northwestern Ry.

The Chicago & North Western Railway passenger terminal in Chicago represents the latest step in perfection of travel comfort. It has a capacity for handling a quarter million people daily, entering and departing from the city on the hundreds of through trains, which operate over the 10,175 miles of splendidly equipped railway of



Chicago Passenger Terminal, C. & N. W. Ry.

this great system, reaching all the important points in northern Illinois, Wisconsin, northern Michigan, Minnesota, Iowa, Nebraska, Wyoming and the Dakotas, with through train service to Colorado, Utah, Idaho, Montana, California and the Great North Pacific Coast states.

Advanced and scientific skill was made use of in providing comforts that no passenger terminal ever before attempted and which no passenger terminal has since surpassed. All the conveniences and appurtenances of a high class hotel are found here with one exception, of sleeping apartments. Never before has such perfectly arranged and so completely equipped quarters been reserved for the exclusive use of women and children, including private rest rooms, tea room, baths, retiring and dressing rooms. First class modern manicuring, hair dressing and shoe-shining parlors provide a feature found in no other railway station.

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Architecturally the best of the past ages has been used to aid in its triumph of delighting the eye with its sym-

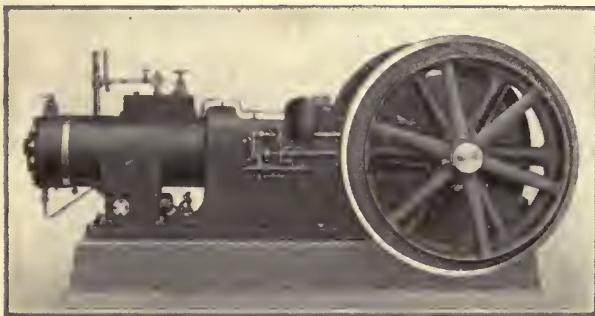


Double Track Scene, C. & N. W. Ry.

metrical lines; it being referred to with pride as "A Civic Monument in the Chicago Beautiful Plan."

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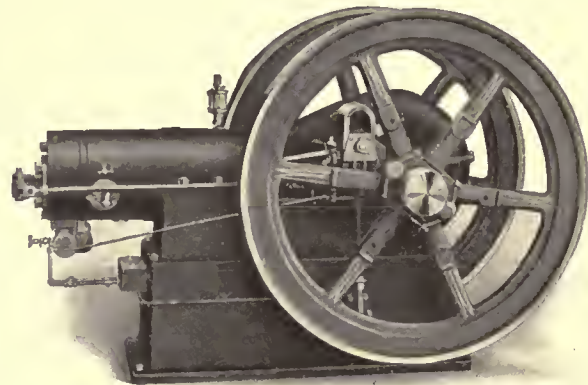
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ELECTRIC LIGHTING  
REFRIGERATING**

**T**HESE engines are very simple to operate having no carburetor or ignitor. Liberal cross head construction eliminates cylinder wear. Positive and easy method of starting.

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Dealers wanting a line of Kerosene Engines will do well to investigate the Lauson Line. They start and operate on Kerosene as easily as a regular gasoline engine and give full rated horse power.

They operate on Kerosene, Distillate, Motor Spirits and other cheap oils, using less than one pint of fuel per horse power hour on one-half to three-quarter load and full load.

They operate with a clear, clean exhaust, regardless of load conditions, the same as a gasoline engine—a feature found only with the Lauson and which shows that all the oil is vaporized and used during each cycle, consequently no raw fuel is left in the cylinder to dilute the lubricating oil. For this reason Lauson Kerosene Engines are equally as long lived as a gasoline engine.

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Colonization and Industrial Agent

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See our Idaho Exhibit in the Ashland Block, Chicago, during August, 1916.





## *Model Irrigation Pumping Plants of the Texas Panhandle.*

The greatest development of the future of irrigation and the largest market for pumping machinery in the United States will be in the Great Plains, where the deficiency of an uncertain rainfall will be met by supplemental pumping from deep wells over many millions of acres.

Trust to the weather farming even in areas of greatest rainfall is only a gamble, but while the present highest development of irrigation is not in California, but in New Jersey, in the Great Plains every farm must have its irrigation pumping plant.

One of the places where irrigation has been begun in the Great Plains is the Matarador ranch at Channing, Texas, comprising 200,000 acres, and specializing in thorobred Hereford cattle and saddle and track horses.

On this ranch there are two deep well irrigation pumping installations, both equipped with "American" deep well turbine centrifugal pumps, belt driven by oil engines.

Well No. 1 is 20 in. in diameter and 100 feet deep. It is equipped with an 18 in.

three-stage pump and delivers 800 gallons of water a minute. Two views of the discharge of this pump are shown at bottom of the page.

Well No. 2 is one-half mile distant from Well No. 1, and the discharge of this well and an exterior view of the pump house are shown at top of page. This well is 20 in. in diameter, 140 feet deep, equipped with an 18 in. three-stage turbine, and delivers 1,200 gallons of water per minute.

These two installations, while of smaller capacity than many pumping plants now installed in the Great Plains, are said to be the model irrigation plants of the Texas Panhandle. These pumps are now in operation the third season, without a cent ever having been expended for repairs.

The capacity, reliability and economy of "American" deep well turbine centrifugal pumps are demonstrating their superiority in the great irrigation development which is now in progress throughout the Great Plains.

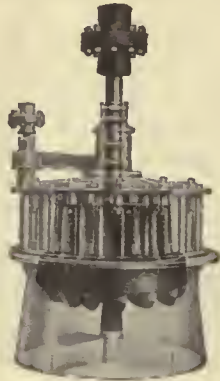
Catalog 132 describes these pumps.  
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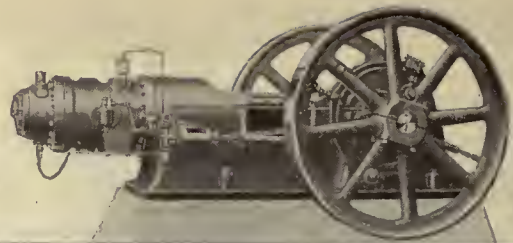


When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the **HIGH SPEED** of the SAMSON, for a given power, lighter and consequently **CHEAPER** transmission machinery can be used.

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Bessemer Engines are running in 16,000 power plants saving and making money for their owners. In many instances these engines replaced motors and steam engines and in all instances have greatly reduced the cost of power.

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(Awarded Gold Medal Panama-Pacific Exposition)

Furnish steady, dependable power by burning the fuel and crude oils, so abundant and cheap. Write us your power requirements and learn what a Bessemer installation will save for you.

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Pormo engine, simplest, lightest, most efficient on the market. Fewest parts, easiest to operate, most economical to buy—cheapest to run. High tension, water-proof, built-in magneto.

Pormo Pumping Unit—Complete 3 h. p. Pormo engine with Gould Centrifugal pump. Weight only 160 lbs. Capacity 125 gallons per minute.

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Thirty-First Year

# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, SEPTEMBER, 1916.

No. 11

## THE IRRIGATION AGE

With which is Merged

The National Land and Irrigation Journal

MODERN IRRIGATION

THE IRRIGATION AGE

ARID AMERICA

THE WATER USERS' BULLETIN

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THE IRRIGATOR

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Official organ Federation of Tree Growing Clubs of America. D. H. Anderson, Secretary.

The Executive Committee of the National Federation of Water Users' Association has taken action whereby THE IRRIGATION AGE is created the official organ of this vast organization, representing 1,000,000 persons on the government irrigation projects.

Will Work on the organization of Federal  
Name Water Users, with a view to holding  
City an annual meeting, this meeting to be  
Soon held permanently in a centrally located city, is progressing and plans will no doubt be sufficiently advanced to permit the announcement of the city chosen in our issue of October. The general opinion seems to be that either Ogden or Salt Lake City, Utah, is the logical center of all Federal irrigation projects, but there is a feeling among a few of those interested that Denver, owing to the location there of the general western offices of the Reclamation Service, would be a better point. As, however, there would be nothing gained from direct contact with the western branch of the Reclamation Service, it is likely that either Ogden or Salt Lake will be chosen as the meeting place and Mecca of the water users.

National  
Federation  
of Water  
Users

A recent visit to Newell, S. D., the headquarters of the Secretary of the National Federation of Water Users' Associations, revealed the fact that this organization has now among its membership a large number of the associations under Federal control and it was decided at a meeting held at Newell, August 14, to merge the American with the National Federation and work in harmony to complete a plan so that all

of the associations may be enrolled in membership in time for the first annual meeting in January, 1917.

The Water Users Associations now working under this plan are as follows: Lower Milk River Water Users' Association, Minidoka Water Users' Association, Tieton Water Users' Association, Pecos Water Users' Association, Shoshone Water Users' Association, Belle Fourche Valley Water Users' Association, El Paso Valley Water Users' Association, Elephant Butte Water Users' Association, Yuma County Water Users' Association, Klamath Water Users' Association, Truckee-Carson Water Users' Association, Huntley Water Users' Association, Salt River Valley Water Users' Association, Sunnyside Water Users' Association, Umatilla Water Users' Association.

It will be seen that a majority of the associations are members. The writer expects to visit within the next month the Grand Valley and Uncompahgre Associations in Colorado, the Strawberry project in Utah, the Orland in California, the Klamath in California and Oregon and the Payette-Boise project in Idaho. Later visits will be made to various other projects, and it is expected that nearly all of the thirty-two organizations will be enrolled as members of the National Federation of Water Users' Associations before December 1st, 1916.

A well known organizer will go into the field at an early date and will visit the various associations at the time of their annual mass meetings to explain

fully the object of the Federation. The annual meeting place and headquarters of the organization will be decided later. It will, no doubt, be one of three cities, Ogden or Salt Lake City, Utah, or Denver, Colorado.

**Congress  
Invites  
Irrigation  
Managers**

The managers of the International Irrigation Congress that will hold its 1916 session at El Paso, Texas, October 14 to 18, have decided to invite all managers of Federal irrigation projects, all engineers in charge of reclamation work and all heads of legal departments connected with the many projects now under construction, to attend this congress. The press bureau of the Congress has sent out a call to this effect and among other statements says that this will be the first time in the history of the Congress that an opportunity has been given the delegates to meet in a body all the practical men engaged in carrying into practice the plans "outlined by the Congress at their annual meetings since the systematic work of reclaiming lands by means of stored water began 25 years ago."

This call was probably written by one of the office boys in the publicity department who evidently was not aware of the fact that the Reclamation Law was not passed until 1902, hence very little work could have been performed prior to its passage.

The question which will confront those who are familiar with the history of irrigation and the various methods adopted to secure the attendance of delegates to the meeting is, who will pay the expenses of each project manager, engineer, attorney or others who may accept the invitation. Will the settlers on the various projects be called upon to pay an assessment for this purpose or will the expenses of the various officials be paid out of the general reclamation fund which would eventually be charged up to the projects and in that way compel the settlers to pay whether or not they wish to do so?

This is apparently an effort to bring the attendance of a dying congress to respectable proportions so that it may not be the laughing stock of the public as was the last congress held at Salt Lake City, and the migratory affair that was "pulled off" in California last year.

The writer of this call also ignores the fact that Congresses held at Ogden, Boise, Portland and Sacramento were packed by Government officials who were there at the expense of the settlers and who balked any move to pass resolutions in favor of the settlers and put through resolutions in praise of F. H. Newell, then head of the Reclamation Service, and his co-worker, Gifford Pinchot, former head of the Forest Service.

If the managers of the El Paso affair attempt any similar move at this year's meeting they will be likely to feel something drop. This again brings to mind the fact that Texas nor any of her citizens are entitled under the provisions of the Reclamation Act to any benefit from it in any form.

The writer expects to visit El Paso soon and on his return he may be in a position to further enlighten our readers concerning the deal that made this condition possible.

**Thoughts on  
Betterment of  
Water Users'  
Condition**

A plan is on foot to have Mr. O. E. Farnham, secretary of the National Federation of Water Users' Associations, visit all of the projects under Federal control at the time of the annual mass meeting on each project and explain to the members the benefit to be obtained by organization and concentrated action. A plan will be outlined by Mr. Farnham whereby sufficient funds may be raised by an annual assessment of not over 1 cent an acre to enable the Federation to send delegates to Washington when necessary, to lay before the proper officials any complaints or grievances.

The work performed by the officers of the Federation in past years has brought good results and in many instances eventuated in changing laws that were burdensome to the settler which would have terminated in putting many of them out of business had relief been refused them. As every settler under Government projects is aware, there is great difficulty and much red tape encountered in every attempt on their part to correct wrongs. The local representative of the Reclamation Service may be in sympathy with the water users, but his effort to obtain relief is often forestalled at Denver or Washington, and the men who are suffering are thereby led to believe that the whole system is wrong.

These conditions may be corrected only by direct contact with "the powers that be," an expression much used in Washington, but one that is only vaguely understood by the man on the land.

It is difficult for the layman to determine what constitutes this stegnosis of official action on the part of "the powers that be." The writer remembers a conversation at Washington some years ago with a prominent Senator on the subject of the repeal of the desert, timber and stone and the commutation clause of the homestead acts, and his statement at that time was as follows: "The powers that be" have decided that nothing will be done with either of these acts this session. In that instance, "the powers that be" could easily have been large interests who were stealing land by false entries under these existing laws. That was fairly clear, but what be-



fuddles the settler who is asking only fair play and the righting of flagrant wrongs, "the powers that be" are so woefully vague that they can only distinguish through the mist the figure of Secretary Lane and his man Friday, Mr. Ryan.

This brings us to another thought: why did Secretary Lane put Mr. Ryan in as comptroller of the Reclamation Service? What did Mr. Ryan know about gravity flow or general irrigation work when his appointment was made? Why did not Secretary Lane search (and he would not have found it necessary to go far) for some man to fill this position who thoroughly understood irrigation and one who had a heart in him sufficiently large to take some of the burdens of the water users over, or at least confer with them individually, or in groups, and work for the betterment of their condition, rather than assume a haughty attitude and compel them to beg for what was theirs by right.

Can anyone answer these simple questions? Another: who and what was Mr. Ryan before his appointment? Was his past record sufficient to recommend him to this position?

## IRRIGATION PROJECT FOR RICE CULTURE

The Grand Prairie Canal Company, organized to construct a 28-mile irrigation canal to provide water from White river to further develop the rice growing industry on the great prairie, has begun construction work on the big ditch. It is expected that it will take a year to finish the project, the first big canal irrigation scheme in Arkansas. Twenty-five thousand acres of rice land can be served from the canal and three main line laterals, though in a few years it is expected the irrigation district will furnish water for much of Grand Prairie, which is 90 miles long and about 20 miles wide.

The main canal will tap White river three miles above De Valls Bluff, Arkansas, and run almost due south to within two miles of Stuttgart, a distance of 28 miles by the course of the survey. It will pass De Valls Bluff between two and three miles to the west and extend south to Mesa, near where the first mainline lateral will be run off, a point seven miles below the head of the canal. Eleven miles below White river the second lateral will be run off, and the third will run from the end of the canal above Stuttgart to the north and east of Stuttgart, according to present plans.

The company is capitalized at \$300,000. A pump station will be put in on White river to lift water 60 feet into the canal, which will follow the highest ridge through the prairie. There is a natural drop or drain of one foot to the mile in the 28-mile course. Excess water will be drained off in small streams that the canal will cross. Eventually, numerous laterals will be constructed to take care of thousands of acres of rice farms in the district.

Grand Prairie is said to be the biggest rice producing center in Arkansas, last year's production running 5,000,000 bushels, which commenced from 90 cents to \$1.10 per bushel.

## "BENEFICIAL USE" THE NEWEST PRINCIPLE

(By George E. McLeod, Special Agent of the California Water Commission)

The former idea of the principle involved in water appropriation was that individuals or corporations might file upon and appropriate the waters of the state at their pleasure, with little or no regulation, in as great an amount as they might elect, and continue to hold and possess such waters without placing the same to any immediate "beneficial use," depriving others of appropriation, capitalizing the water rights so obtained at get-rich-quick figures and speculating in a natural resource through the growth of the community—all to the detriment of the real owners of the water, the people. Under this idea immense appropriations of water have been made, and there has been an impression held by some that not much water remained unappropriated; but such is not the case. There is a vast amount of water still unappropriated, and it is this vast empire of water which it is the intent of the Water Commission Act to protect and conserve to "beneficial use," as well as the waters which may revert to the state through forfeiture and again become unappropriated waters.

The aims and objects of the Water Commission Act are therefore directed toward a continual study to protect the waters that are left and to see to it that they are "beneficially used," not merely held, and with an avoidance, as far as may be, of long, unnecessary and costly suits to determine the rights of various claimants on common sources of supply. The use to which waters may be put under the act is divided into four classes, viz.: agricultural, power, mining and municipal supply. In the matter of domestic supply for cities, that is, water used for what may be termed "human consumption," municipalities have what is termed a "preferential right" over the individual; and the state, any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the state shall have a right any time after the expiration of a period of twenty years from the time a license has been granted to an individual (or corporation) to purchase the works and property occupied and used under such license, paying therefor a price to be determined under proceedings of eminent domain—that is, condemnation of the property by the people, with compensation for the property so condemned. Thus it may be seen the intent of the act has always in mind the People, the People, the People.

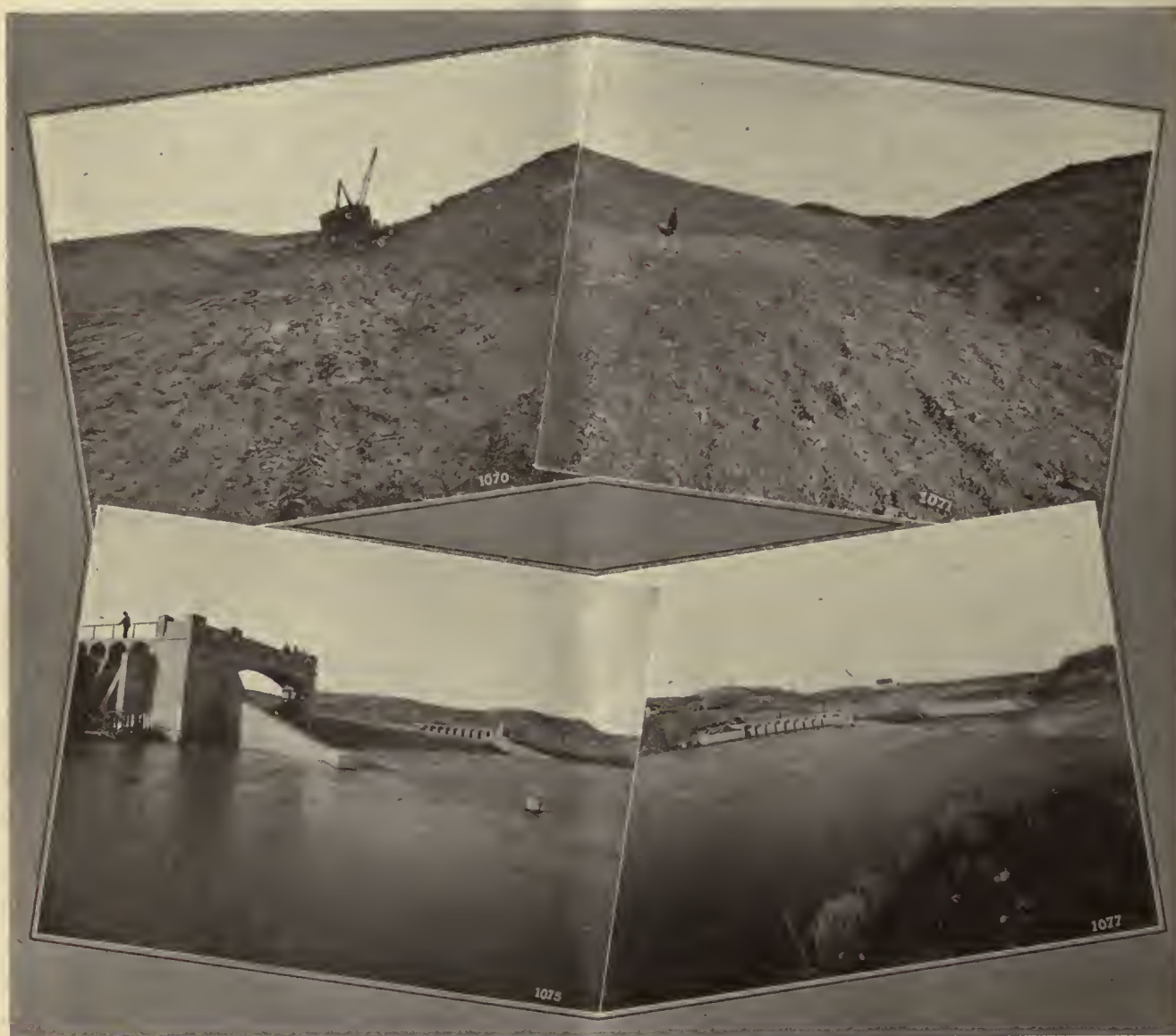
This latest idea of "beneficial use" is somewhat a new one and one of strict construction. An intending appropriator cannot merely formally declare that he will put waters of the state to "beneficial use," for the purpose of acquiring the water, but he must say how, when and where, to express it tersely. All applications are subjected to the closest scrutiny and examination by competent authority.

Send \$1.00 for 1 year's subscription to the IRRIGATION AGE and bound copy of THE PRIMER OF IRRIGATION. If you desire a copy of The Primer of Hydraulics add \$2.50 to above price.

## NORTH PLATTE IRRIGATION PROJECT AND ASSOCIATED UNITS

The North Platte Project contemplated the storage and diversion of the waters of the North Platte River for the irrigation of lands lying in the North Platte Valley in eastern Wyoming and western Nebraska. It comprises all of the work on the North

portion the rainfall is at times sufficient to grow crops, while in the western portion arid conditions are found. According to the last census, within the drainage basin of the Platte River is found the largest area of land irrigable by one stream in the United



1070—Irrigation Ditch, Fort Laramie, Wyoming  
1071—Irrigation Ditch, Fort Laramie, Wyoming

1075—Whalen Dam, Wyoming  
1077—Headgates, Whalen Dam, Wyoming

Platte River, extending from the town of North Platte on the east, near the 101st meridian, to the point where the North Platte enters the State of Wyoming from Colorado, about the 107th meridian, a distance—measured by the winding river—of about five hundred miles. The project, as constructed and contemplated, lies about 100 miles northeast of Cheyenne, Wyoming. In the easterly

States and the value of the improved agricultural land is probably as high as any other section, with the possible exception of the fruit belt of California.

At the present time the building of the Interstate Unit of this project is completed, as is also the Pathfinder dam and storage works. The building of the Fort Laramie Unit, on the south side of the river, was authorized during the summer of 1915,



and active operations are now under way on the construction of the main canal and the surveys of its distributing system. Under the law of June 25, 1910, no land will be available for homestead entry under the Fort Laramie Unit until water is available therefor.

The North Platte River carries the run-off from a large and mountainous territory. Its catchment basin contains the mountains of North Park in Colorado and the Ferris, Green, Seminole, Laramie and inferior ranges in mountainous Wyoming. Through its tributary, the Sweetwater River, it also carries the run-off from a considerable portion of the Continental Divide. Rising in the mountains of northern Colorado, the river flows in a northerly direction into Wyoming, where, after traversing half the state, it turns to the southeast and continues in a southeasterly direction to its junction with the South Platte in central Nebraska. These geographical features determine largely the principal characteristics of the stream. During the spring and early summer the melting snows of the mountains swell its volume to large proportions, while in the late summer the long continued drouths shrink its volume to that of a small stream distributed over a wide stretch of shifting sands. On account of this irregularity of flow, it was found necessary to provide means for the storage of the flood waters of the spring and early summer, in order that they might be delivered to the thirsty lands under the various canals evenly throughout the season. To meet this necessity the Pathfinder Reservoir was built. This Reservoir receives the drainage from about 12,000 square miles, and the river has an average run-off of 1,400,000 acre feet at Pathfinder dam. The area of the reservoir at the level of the spillway is 22,600 acres, and the capacity is 1,070,000 acre feet. The dam is one of the largest masonry dams in the world, rising 218 feet above the rock foundation. It is 432 feet long and 10 feet wide on the top and is 80 feet long and 90 feet wide on the bottom. It contains 60,210 cubic yards of masonry. In connection with the dam there have been constructed two tunnels, respectively 480 feet and 360 feet in length, through which the stored waters are supplied to the river for diversion at points farther down the stream, the discharge being regulated by high pressure gates. On the north side of the river a spillway 600 feet long has been cut in solid rock adjacent to the dam to allow the discharge of surplus water after the reservoir is filled. Near the south end of the dam an earthen dike has been built to close a gap in the wall of the reservoir, which was lower than the spillway. Inland reservoirs on the Interstate Unit add about 78,000 acre feet to the available water supply of this unit. These are filled in the early spring and late fall by carrying water

which would otherwise be wasted from the river through the canal.

#### Items of Historical Interest

The country embraced within the project of the North Platte was probably well known earlier than almost any other portion of the West. The returning Astorians, in 1812, passed down the North Platte River, making their first winter camp of that year at the town of Bessemer, fifteen miles above Casper, and later in the vicinity of the State line between Nebraska and Wyoming, in all probability very close to the present town of Mitchell—the headquarters of the Reclamation Service. First, the intrepid hunter and trapper blazed the way, and later the fur-trading companies pushed into the North Platte Valley, and, in 1834, established a trading post on the site of the present town of old Fort Laramie, which was maintained by them until taken over by the Government in 1849, when it became one of the most prominent posts on the transcontinental route. This route was followed by the California gold seekers and by the Mormons in their migration westward. To read "The Adventures of Captain Bonneville" and "Astoria," by Washington Irving, the discoveries of John C. Fremont, histories of Mormon emigration and the "Forty-niners," and later of "Wild Bill" and "Buffalo Bill," reveals this valley as rich in historical interest. The discoveries of Professor March, and others, of the pre-historic horse and the great saurians make the region one of unusual interest to the student of the earth's history. On the other hand, the settler and the homebuilder passed it by and settled to the north or south, or pushed on to Utah and California. The great highway, 200 feet in width, now overgrown and only distinguished from the general surroundings by the difference in vegetation, stretches on mile after mile. It is marked here and there by a grave, the occupant snatched from the eager horde pressing over west; name, age, date forgotten; whether the victim of disease or savage, unknown. But occasionally we may read something like this on a rare headstone: "Amanda, beloved consort of William Smith, born May 5, 1831; died of cholera July 10, 1850." It requires little imagination to weave a romance around such an epitaph in such a place. Again, the name Scotts Bluff recalls the tragedy of a lonely death, Irving relates, in his "Adventures of Captain Bonneville," how a party "encamped amid high and beetling cliffs of indurated clay and sandstone, bearing the semblance of towers, churches, and fortified cities," recalled the melancholy circumstances from which the fantastic bluffs received their name, the story of one of an unfortunate party, a man by the name of Scott, who, after abandonment by his com-

panions because of illness, crawled a distance of sixty miles before death put an end to his miseries, "and the wild and picturesque bluffs in the neighborhood of his lonely grave have ever since borne his name."

The very name bestowed upon the dam—"The Pathfinder"—conjures up memories of a brave and stirring epoch in our national expansion. A fitting monument to the sturdy explorer, John Charles Fremont, a mighty figure of the romantic pioneer days, this giant structure of modern masonry rears its lofty crest on the site where the explorer was wrecked in his attempt to reach the Missouri River by water, and a wondrous valley made fertile by the magic touch of water now greets the eye where once the Indian and buffalo reigned supreme.

We thus see a revival in the locality where more than half a century ago was the best-known and most-traveled route across the continent, and after being all but forgotten is now receiving the attention which it should have received in the '60s. The South Platte Valley, 150 miles south of the great highway, was developed through sheer force and energy of its people, while the North Platte has remained in an undeveloped state, though in all respects equal to the South Platte Valley. The climate, soil and flora in both valleys are almost identical.

#### Statistical Statement of Central Features

1. States: Nebraska and Wyoming.
2. Counties: Pathfinder Unit, Carbon and Natrona, Wyoming; Interstate Unit, Goshen, Wyoming; Sioux, Scotts Bluff and Morrill, Nebraska; Fort Laramie Unit, Goshen, Wyoming; Scotts Bluff and Banner, Nebraska.
3. Latitude, 41° 30' to 42° 00'; longitude, 103° to 107°.
4. Townships, 20 to 30 North, Ranges 49 to 85 West, 6th P. M.
5. Altitude, 3,800 to 4,500, reservoir basin 5,800 feet above sea level.
6. Irrigable area: Interstate, 129,000 acres; ownership, 72 per cent public, 28 per cent private. Fort Laramie Unit, 100,000 acres; ownership, 64 per cent public, 36 per cent private.
7. Size farm units: Public, 80 acres; private, 160 acres.
8. Water shed area: Pathfinder Unit, 12,000 square miles.
9. Estimated average annual run-off: 1,400,000 acre feet at Pathfinder Dam.
10. Storage reservoir: Pathfinder, area 22,600 acres capacity, 1,070,000 acre feet. Inland reservoirs interstate unit, area 3,000 acres; capacity, 78,000 acre feet.
11. Diversion dam: Whalen type, concrete

weir; height, 25 feet; length, 300 feet, with head-works for Interstate and Fort Laramie Canals.

#### Interstate Unit

12. Towns on project; Bayard, Minatare, Scotts Bluff, Mitchell, Morrill, and Henry, Neb.; Torrington and Lingle, Wyo. Pathfinder Unit: Caspar, Wyoming. Fort Laramie Unit: Gering, McGrew and Melbeta, Nebraska.

13. Location land offices: Alliance, Neb., and Cheyenne, Wyo.

14. Soil: Sandy loam.

15. Prevailing winds: West and northwest.

15(a) Temperature: Maximum, 104°; minimum, 30°.

15(b) Precipitation, 15 inches.

16. Principal products: Alfalfa, sugar beets, cereals, corn and potatoes.

17. Markets: Omaha, Kansas City, St. Joseph, Chicago, Denver and central Wyoming.

18. Value of irrigated lands: \$25 to \$125 per acre.

19. Value of non-irrigated lands: \$2.50 to \$10 per acre.

20. Capital required: Entirely dependent upon the individual.

21. Railroads: Interstate Unit, Chicago, Burlington & Quincy; Fort Laramie Unit, Union Pacific.

22. Duty of water: Two and one-half acre feet per acre per annum.

23. Length main canal: Interstate, 178 miles; Fort Laramie, not constructed.

24. Length laterals: Interstate, 626 miles; Fort Laramie, not constructed.

25. Fuel supply: Wood and coal, not produced locally.

26. Power developed: No plans yet developed.

27. Domestic water supply: Wells, 30 to 200 feet deep.

28. Length of irrigating season: From April 1 to September 30, 183 days.

29. Date of opening: Interstate Unit, July 29, 1907.

30. Construction charges: Interstate Unit: \$55 per acre; Fort Laramie Unit, no charges announced. Maintenance and operation, see sections 5 and 6 of the Reclamation Extension Act.

31. Per cent project completed: Pathfinder Unit, 100 per cent; Interstate Unit, 95 per cent; Fort Laramie Unit, 1 per cent, January 1, 1916.

#### Area of Irrigable Land

The valley of the North Platte is about fifteen miles wide. On the north side of the river, the irrigable land, under the Interstate Canal, embraces an area of 129,000 acres, 83,000 acres of which are in public, 29,000 acres in private ownership and 17,000



acres under the Carey Act project of the North Platte Canal and Colonization Company, in Wyoming. These lands are mesa or table lands lying from 50 to 200 feet above the river. Between this table land and the river there is bottom land about one mile in width which has been irrigated for a number of years, the principal crops being alfalfa and native hay, sugar beets and small grains.

On the south side of the river under the Fort

acres, depending upon the physical character of the land. In arranging the farm units non-irrigable tracts were attached to farm units wherever practicable, so that the settlers might be given the use of as much dry land as conditions permit. This non-irrigable land is not taxed with water charges.

#### Town and Community Life

The great and expansive plains from which the old deserted highway is fast disappearing, leaving



1091—Flume, Hawk Springs, Wyoming  
1092—Hawk Springs Reservoir, Wyoming

1093—Hawk Springs Reservoir and Dam, Wyoming  
1094—Main Canal and Dam, Hawk Springs, Wyoming

Laramie Unit, there are about 120,000 acres of land awaiting development, the construction of the main canal having been started in 1915.

#### Size of Farm Units

The average farm unit on the North Platte Project contains eighty acres of irrigable land. The total acreages of these units range from 40 to 160

only thrilling memories of "The Pathfinder," the "Forty-niner," the dashing soldier of fortune and the patient pioneers, is rapidly becoming the home of the prosperous small farmer and is undergoing a transformation never dreamed of twenty years ago. The days of the cattle baron in this valley are past and he is being driven farther and farther into the hills

each year by the rapid approach of the incoming settlers. The great range is being divided into small farms of 40, 80 and 160 acres. Where but a short time ago the coyote and prairie dog were the only inhabitants, irrigation has built up large communities; large fields of alfalfa, sugar beets and other crops are taking the place of the native grass. Although still in its infancy, this valley is keeping step with the development of community life in other parts of the country, taking great pride in its schools, churches, and other social and intellectual organizations.

The principal towns embraced in the North Platte Project are on the north side; Guernsey, Lingle and Torrington in Wyoming, and Henry, Morrill, Mitchell, Scotts Bluff, Minatare, Bayard and Bridgeport in Nebraska. Guernsey is located 8 miles above the headworks of the Interstate and Fort Laramie Canal, and, although not in the irrigated section, is a thriving town of about 4,000 people. Torrington is the county seat of Goshen county and has a population of about 700. Henry, a town of about 100 people, on the state line, attracts many visitors in the summer on account of the good fishing nearby. Morrill is a thriving town of about 500 people, and is the railroad point for Dutch Flats. Mitchell is a prosperous town with 1,000 inhabitants, containing the headquarters of the Reclamation Service for the North Platte Project. Scotts Bluff is the largest town in the North Platte valley, with a population of 3,500. The second largest sugar factory in the west is located here. Minatare and Bayard are thriving towns lying within the irrigated district with populations respectively of about 500 and 400. Bridgeport, the junction of the Bridgeport-Guernsey line with the Denver-Alliance branch of the Burlington railroad, is the county seat of Morrill county. It has a population of about 700. The towns named are from 8 to 15 miles apart; the distance between Bridgeport and Guernsey being 98 miles.

On the south side of the river, the Union Pacific is building a line from North Platte, Nebraska, westward through the valley, its terminus on January 1, 1916, being about 10 miles west of Gering. Gering is the oldest town in the valley, having now a population of about 1,800 inhabitants, and is the county seat of Scotts Bluff county. With the advance of the North Platte branch of the Union Pacific railroad, the new towns of Haig, Melbeta and McGrew are starting on the south side of the river, none of which has a population exceeding 100 inhabitants.

With the development of the public and private irrigation systems in the valley, these towns have grown steadily, substantial buildings have been erected and light, water and sewer systems have been built in nearly all the larger towns.

### Splendid Region of Irrigated Farms Now Opened Up by Railway

The completion of the California Southern Railway to Blythe in the Palo Verde Valley and the arrival of the first regular passenger train at 9:28 a. m. of August 15th, is an event of great importance in the development of irrigable lands of the southwest. A regular schedule of one train each way daily will be maintained between Blythe and Blythe Junction on the Santa Fe. Pullman sleeper service will be provided three times a week. The railroad renders unnecessary the mule haul of forty-two miles of all merchandise to and from this fertile and rapidly growing region. The builders are the kind of men who look to the future and they have provided track and roadbed adapted to a permanent and increasing business. Lasting drainage structures are a feature of the work, Armco iron culverts having been employed throughout.

The Palo Verde Valley contains one hundred thousand acres of irrigable lands, forty thousand of which are now under cultivation. It is believed that the coming of the railroad will make it practicable to extend irrigation to the valley's 250,000 acres of mesa citrus land. Some of the products now being shipped out or prepared for shipment are 20,000 hogs, 10,000 sheep, 2,000 milch cows, about 2,000 head of beef cattle, 4,000 turkeys and several thousand chickens; 10,000 acres are devoted to alfalfa and it is stated that the average yield is eight tons per acre. Six thousand tons of cotton are produced annually and manganese is now being shipped out at the rate of three cars per day.

The sources of irrigation water is the old Blythe intake, which is hewn out of solid granite. It is 40 feet wide and 20 feet deep and delivers 100,000 inches of water to the valley floor. This water filing is the oldest on the Colorado river, having been taken up in 1877 by O. P. Calloway and Thomas Blythe.

The first cotton, rice and hemp to be grown in California was produced in the Palo Verde Valley and displayed at the old Blythe building in San Francisco forty years ago.

Thus another inland empire has been opened in a region which was considered by the first American settlers in California as hopelessly desert. There is every reason to expect even more rapid development in the Palo Verde than has transpired in the famous Imperial Valley.

### COST OF SILO FILLING

No definite cost can be given for silo filling, as it depends on many variable factors, such as the distance from field to silo; weather conditions, it being more expensive during wet weather than clear weather; the efficiency of the machinery and of the men. The cost has been estimated as low as 40 cents, and as high as \$1 per ton. Seventy-five cents would probably be a fair average.

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WANTED—Manager, also civil engineer; 68,000-acre project; long experience and proven ability must be shown; give full particulars and references first letter. Address Alba Heywood, secretary, Cameron County Irrigation District No. 2, San Benito, Texas.



## SAN BENITO, TEXAS, IRRIGATION DISTRICT

Acting under the terms of the Irrigation District Law passed by the 33rd Texas Legislature, the land owners under the irrigation system of the San Benito Land and Water Company at San Benito have voted to organize an irrigation district and purchase the canal system. Only four votes were cast against the formation of the district.

San Benito Land and Water Company, owners of the irrigation system, has been, since July, 1913, in the hands of a receiver in the United States District Court.

The irrigation system which is the largest in the lower Rio Grande Valley and one of the largest in the southwest was started in 1907 and its construction cost about \$1,500,000. It is partially a gravity system, water being available by gravity during high water periods in the Rio Grande. The main canal is 37 miles long and averages 300 feet in width and about 200 miles of lateral canals traverse the territory it serves. Due to the Delta formation in the lower part of the lower Rio Grande Valley in which this system is located the water in the main canal is held in the main canal at five levels, the highest being at the bank of the river from which it is dropped or locked down four feet at a drop to each of the four succeeding levels.

The newly formed district which is known as Cameron County Irrigation District No. 2, comprises 52,000 acres and, in addition to this acreage, the district has entered into a contract to water 16,000 acres of land adjoining the district belonging to the San Benito Irrigation Company. About half of the land in the district proper is in a high state of cultivation, the principal crops being cotton, sugar cane, corn, feed stuff, citrus fruit and winter truck. The section has just closed an especially successful truck season. The towns of San Benito, 4,500 population, Los Indios, Rio Hondo and La Paloma are located within the general boundaries of the district, but the towns themselves are excluded from the district. San Benito is on the Gulf Coast Lines, 19 miles north of Brownsville and 8 miles east of the Rio Grande. The district is traversed by the lines of the San Benito and Rio Grande Valley Railway, with headquarters at San Benito, which road does a general freight and passenger business by steam trains and motor cars. This road operates over about 50 miles of line and makes a loop over the district, affording convenient transportation to every part of the section included within the district, and has proven of exceptional convenience in handling the heavy tonnage of sugar cane and truck produced on the tract.

At the election at which it was voted to form an irrigation district, P. R. Foley, Richard Mitchell, N. R. Shafer, J. L. Landrum and Alba Heywood were elected directors and upon organization of the board P. R. Foley was elected president and Alba Heywood, secretary. An agreement has been entered into between the directors and a committee of the holders of the balance of \$1,050,000 in bonds issued by the San Benito Land and Water Company where-

by the bondholders' lien will be foreclosed and the property sold on order of the court and re-sold to the newly formed district. Six hundred thousand dollars worth of 6 per cent bonds will be issued by the new district, \$360,000 of which will be paid for the canal system as it stands, \$150,000 sold at par and accrued interest through the W. R. Compton Company of St. Louis, which company handled the original bond issues by San Benito Land and Water Company, and \$90,000 in bonds will be handled by the district through other channels. The property contracted to be purchased includes in addition to the canal system and pumping and intake facilities the office building, a \$16,000 building located in the town of San Benito and all equipment used in the operation of the irrigation system, but not does include the utilities plant in the town of San Benito, light, water and phone, which is owned by the San Benito Land and Water Company and involved in the same receivership proceedings with the canal system.

The \$240,000 placed at the disposal of the district above the purchase price of the canal system will be used in needed improvements and extensions. Improvements which will be made immediately call for the dredging of a part of the main canal lying near the river and the dredging and cleaning of several miles of laterals. Irrigation projects in the Lower Rio Grande Valley have all had to contend in greater or less degree with silt problems similar to those which have beset canal operators in the Imperial Valley, the Rio Grande carrying a very high percentage of silt. This silt has deposited in the first few miles of the main channel during the past six or seven years to such an extent as to prevent the taking of gravity water at any but times of very high water in the river. With the opening of this channel by dredging to its original depth the canal system can take a very large percentage of the water required by gravity, thus materially reducing the expense of pumping. The directors of the new district propose, once this channel is opened again, to keep in operation suction or other dredges of suitable type to keep it open, which they will purchase or contract to keep in operation. Replacements of water gates and conduits will be made with gates and conduits of the latest and most durable type. Such additional pumping machinery as will be installed by the district at the headworks will be internal combustion engines direct connected to centrifugal pumps. The contract to water the adjoining 16,000 acres of the San Benito Irrigation Company calls for the installation at the expense of that company of pumping facilities at the headworks of the district of this type and for the furnishing of water to their lands in units of 500 acres each as fast as they are equipped with canals and the pumping facilities installed with which to furnish water.

The San Benito District is the third in the Lower Rio Grande Valley organized under the new Irrigation District law.



## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### California

Cape Horn Tunnel, designed to convey water for the irrigation of 10,000 acres of land around Oakdale, in Stanislaus county, has been completed. This land is in addition to the area already under irrigation in the Oakdale district.

Jas. Kennedy, of Los Angeles, has been awarded the contract to construct the proposed Lindsay Irrigation District. Work on the district will be begun in the near future and will be rushed to completion within the shortest time possible. An office will be maintained at Lindsay with John P. Kennedy personally in charge. The project will supply water to 15,000 acres of choice orange land.

At a recent meeting held at Herald an irrigation district, comprising about 40,000 acres in the southwestern part of Sacramento county, was organized. E. R. Walker, representing the Hobart-Hayward-Lane interests, of Sacramento, has been promoting the project for years, and as soon as the approval of the state engineering department has been secured and the bonds sold, construction will be commenced. Water will be taken from the Cosumnes river. The land is of

the rolling foothill type and is admirably adapted to olives.

At a special election held recently at Terra Bella, the Terra Bella Irrigation District bonds carried by a vote of 59 to 1. The bonds call for an issue of over \$1,000,000. The proposed irrigation district embraces a wide area, taking in Terra Bella and the land on every side of it to the extent of 13,000 acres.

Application for permission to appropriate 20,000 cubic feet per second of the waters of Kings river for the irrigation of 1,200,000 acres in Fresno, Tulare and Kings counties has been made to the State Water Commission by M. F. Tarpey, E. R. Reed, J. W. Beall and Geo. E. Rice, of Fresno county, and Chas. King, of Kings county. The petitioners are irrigation district trustees and state they intend erecting a concrete dam 300 feet high and 1,200 feet wide on top to store 600,000 acre feet of water for irrigation.

The Madera Canal and Irrigation Co., with headquarters at Fresno, has filed a petition with the State Railroad Commission for permission to raise its water rates and extend the area

of the minimum charge from 8,000 to 24,000 acres. The reasons given are that the company is losing money, that the 115 pumping plants of the region are lowering the ground water level and are taking the water bought by the canal company from the soil without compensation, and that the company has been compelled to spend \$50,000 in litigation to protect the rights of the people in the district. The company seeks to double its rates.

### Colorado

The bondholders of the Orchard Mesa Irrigation district in the east have deposited the \$5,000 required by the government for the proposed survey and investigation of the Orchard Mesa system prior to the government consideration of including the system under government control in Grand Valley.

The irrigation project which the farmers living about twelve miles from Mortrose are building is half completed. When finished it will cost about \$40,000 and will irrigate about 4,000 acres. The main feature of the project consists of a ditch about six miles in length, tapping the Roubideau creek. It is expected to have



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water available for irrigation by next season. It is estimated that the project will cost \$10 per acre.

#### Idaho

The state land board has taken under advisement the question of forfeiting the contract of the Twin Falls-Salmon River Land & Irrigation Company to irrigate the lands within the Salmon River project. The project originally covered 40,000 acres. The irrigation and drainage commission created by the last legislature recommended that it be reduced to 26,000 acres. The settlers contend that the water supply is short; that they contracted for  $3\frac{3}{4}$  acre feet and secured less than one foot, and that because of the lack of water most of the crops have been a failure. The land board is considering calling for the appointment of a receiver to take charge of the project. The company is fighting the proposal.

The conference committee on the agricultural bill struck out Senator Borah's recent amendment appropriating \$10,000 for the examination of the Black Canyon irrigation project. The house refused to accept the senate's amendment, saying that such an appropriation should come out of the reclamation fund and not out of the treasury.

Through the conveyance of irrigation water from Wilson creek across the Boise river through pipes some 5,000 acres of land will immediately be added to Canyon county's agricultural area. The section which is to be irrigated lies immediately above the Sebree canal and is owned by H. A. Griffith, county attorney, and other citizens of the county. Water from Wilson creek, by which the land is to be irrigated, was filed upon by Mr. Griffith, and from him the other owners of the land will purchase their water for irrigation.

A committee of three prominent engineers has examined the site of the Mackay dam and the work done on the present dam structure, and state that a safe and serviceable dam can be built on the Big Lost River near Mackay, and as a result of this report the Utah Construction Company will at once commence the work of reconstruction and will complete the project, which will ultimately reclaim 70,000 acres of land.

The Reynolds creek irrigation project, located at Wilson, in Owyhee county, is being pushed rapidly to completion. The length of the main canals is about five miles each. The land to be irrigated lies about 20 miles south of Nampa and 30 miles southwest of Boise.

The Lewiston Bear Lake Irrigation Company has just awarded to the Salt Lake Hardware Company the contract for the installation of four pumping units of 45,000 gallons per minute total capacity, to be installed on the Bear river, about two miles west of Fairview, Ida. The entire in-

stallation, including the pumping station, diversion canal, pipe line, will involve an expenditure of close to \$70,000, the pumping equipment costing a little less than two-thirds of the total cost.

The Utah Power & Light Company is to supply the electric power required for driving the 350 horsepower motors, each of which drives an 18-inch centrifugal pump. The power will be supplied from the New Grace and the Oneida plants on the Bear river, a short distance north of the site of the pumping plant.

#### New Mexico

R. C. Storrie, of San Francisco, Cal., has signed a contract to complete the irrigation project at Las Vegas, N. M., undertaken some years ago by the Campfield Company, but abandoned on account of lack of capital. The project will reclaim land on the Las Vegas mesa and water will be taken from the Gallinas river. It is expected that the reservoir will be ready to receive water next spring, but the whole project will not be completed until January, 1918. The contractor will

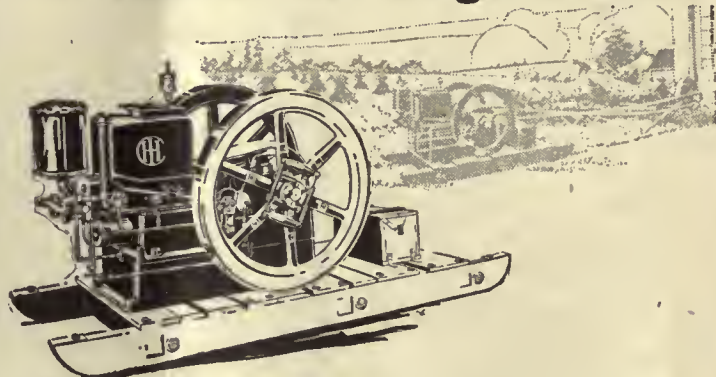
receive 14,000 acres of the Las Vegas land grant for building the project.

The sum of \$75,000 is to be raised on 7,500 acres under the Springer reservoir system in Colfax county, of which \$65,000 is to be expended on the new reservoir, for which the surveys have been completed, and \$5,000 to enlarge the present ditches. The new reservoir will have a capacity of two acre feet for every acre under it, or storage for two irrigations for the 7,500 acres. In the future the water is to be measured out to the farmers.

#### Oregon

State Engineer Lewis, in co-operation with J. T. Whistler, of the United States Reclamation Service, has just completed the preparation of plans and estimates of cost for the reclamation of 60,000 acres of land in Warner county and of 36,000 acres along the White river in Wasco county. Under the Warner Valley project it is proposed to drain a large area of swamp lands in that section so that 33,000 acres can be irrigated by gravity and 27,000 acres by pumping in the south end

## A Check on Engine Cost



**M**ANY people still seem to think that the less they pay for an engine the more they get for their money. There are 6-H. P. farm engines on the market ranging in price from about \$100.00 to \$250.00. Some men say, "6-H. P. is 6-H. P. If I can buy 6-H. P. for a hundred dollars, why should I pay more?"

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of the valley. It is estimated that the development will cost approximately \$1,726,000. The irrigation of the 36,000 acres of land lying on both sides of the White river, a short distance above its junction with the Deschutes, it is estimated will cost \$1,300,000. The project, in addition to using the waters of White river, will be supplemented by the storage of 18,000 acre feet in Clear lake, and also with the waters of Gate, Rock and Three Mile creeks.

The Thompson Cattle Co., of Hereford, proposes to construct a private irrigation project on the upper Burnt river. The company has an excellent reservoir site and will impound water from several small streams.

Petitions are being signed for the formation of an irrigation district in order to bond 12,000 acres under the Western Land & Irrigation Company's system. The plan is to build a reservoir in Alkali canyon with a capacity of about 12,000 acre feet of water and a feed canal from the Umatilla river, with a diversion point near the Furnish reservoir.

#### Miscellaneous

By a unanimous vote of ranchers whose farms will be covered by the system, an irrigation district was formed in the Underwood fruit section in Washington recently. Approximately 400 acres of orchard land will be irrigated by the proposed system, the water to be pumped from the White Salmon river.

The Selah Irrigation district in Washington has applied to the reclamation service for the purchase of 20 of from 1,500 to 2,000 acres of land lying above the present Selah canal, and which may be irrigated by pumping if the water is available.

Gov. Emmet D. Boyle of Nevada has appointed W. W. Coleman, of Carson City, to be water commissioner for Lyon county and Chas. Board, of Yerington, as commissioner to take charge of the water gates and divide water for irrigation purposes

among the farmers. Times of low second feet of water for the irrigation water in the streams in the past have been filled with ill feeling on the part of the farmers, who want all the water they can get, and the appointment of water commissioners is to provide for an equitable distribution.

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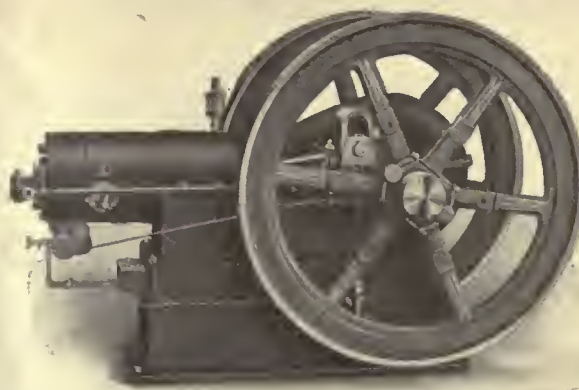
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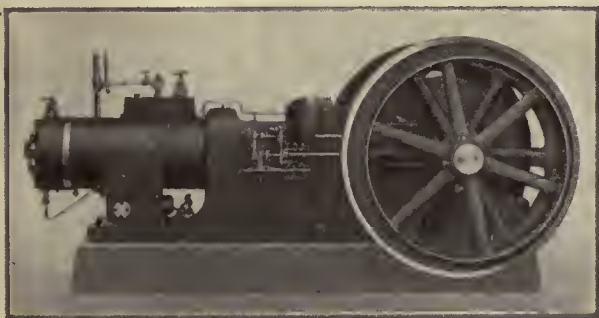
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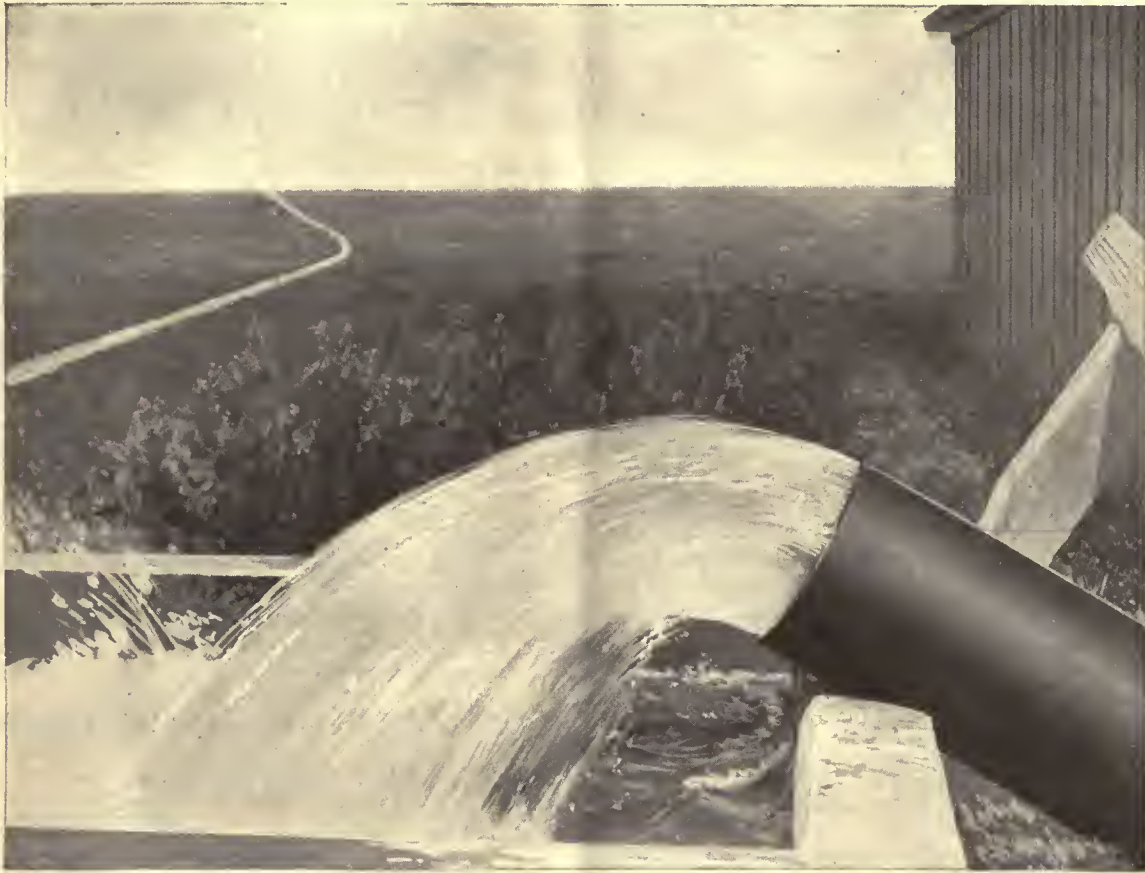
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Mr. McMillan owns several sections of land, and raises registered Hereford cattle and Duroc Jersey hogs.

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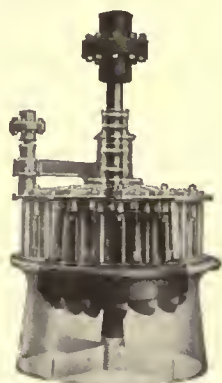
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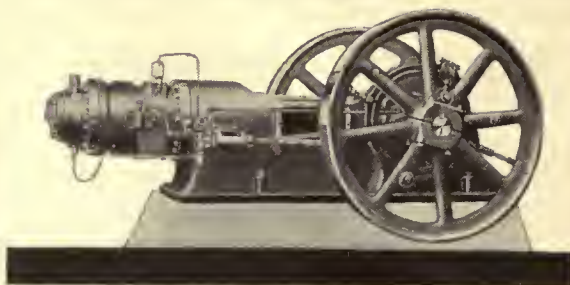
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Thirty-First Year

# THE IRRIGATION AGE

VOL. XXXI

CHICAGO, OCTOBER, 1916.

No. 12

## THE IRRIGATION AGE

With which is Merged

The National Land and Irrigation Journal

MODERN IRRIGATION

THE IRRIGATION ERA

ARID AMERICA

THE WATER USERS' BULLETIN

THE DRAINAGE JOURNAL

MID-WEST

THE FARM HERALD

THE IRRIGATOR

D. H. ANDERSON

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D. H. ANDERSON, Editor

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Official organ Federation of Tree Growing Clubs of America. D. H. Anderson, Secretary.

The Executive Committee of the National Federation of Water Users' Association has taken action whereby THE IRRIGATION AGE is created the official organ of this vast organization, representing 1,000,000 persons on the government irrigation projects.

### Land For the Landless

The Reclamation Record for October informs its readers that Uncle Sam still has considerable land to give to enterprising citizens, men or women, who wish to establish a home.

Secretary Lane recently announced that more than a quarter of a billion acres of land remain in the public domain. This is verified by official figures compiled by the General Land Office. This land is located in twenty-five states. All but 2,290,000 acres of it is in the far west. Nevada contains the highest acreage.

The exact amount of land that is unreserved and unappropriated is 254,945,589 acres. Of this amount, approximately 92,000,000 acres are unsurveyed.

From the foregoing it may readily be seen that your Uncle Samuel is prepared to help an army of land-hungry individuals in the way of furnishing the essential base for a good living in the form of land.

### National Federation of Water Users

The prospect for a meeting of the various Water Users' Associations under the auspices of the National Federation of Water Users is good.

A meeting of the various heads of the Association will no doubt be held at El Paso, Texas, just prior to or following the meeting of the International Irrigation Congress.

The editor of IRRIGATION AGE visited Montrose and Grand Junction, Colorado and Salt Lake City and Ogden, Utah, in September. Representatives of both the Uncompaghre and Grand River projects will attend the general meeting to be held in January, 1917.

No decision has yet been reached as to the permanent meeting place of the Congress, but there is a possibility that Denver may be chosen, as some numbers of the executive committee seem to favor that city, owing to the fact that the General Western Headquarters of the U. S. Reclamation Service is located there. Other members of the committee favor Salt Lake City, as it is the most central point, this city being, in fact, located in about the geological center of the scattered projects, 26 in number.

It is hoped that in our November issue we shall be able to state definitely the permanent meeting place.

Much interest is exhibited in this movement, and as there are many conditions that need modification and correction, the Organization should be in sufficiently good working order that a committee may be despatched to Washington during the next session of Congress with sufficient power vested by the National Federation of Water Users to command the attention and respect of congressmen and officials of the Department of the Interior. Full reports of all activities in this direction will appear regularly in the columns of the IRRIGATION AGE.

**Why  
Not  
Investigate  
Now?**

No one who has known the irrigated west in past years, prior to 1900, and who has not visited the western states since that year, can realize what strides have been made in development. This was brought to the mind of the writer in a recent trip through Colorado, Utah, Idaho and Wyoming. Utah and Idaho appear to have made greater headway than their sister states, and this is no doubt due to the fact that in each of these states the work of reclamation has been carried on by both Federal and private effort. In these states the work done by private capital has gone far ahead of any other state with the exception of California.

The Twin Falls section of Idaho, which has been developed largely through the efforts of private corporations, is perhaps the best illustration of the benefits of irrigation in the United States, if not in the world.

It is safe to say that the annual acre profit in the Twin Falls South Side tract is greater than any similar purely agricultural area in the world. This, it should be understood, is on ordinary farm crops and live stock, and should not be confounded with the extremely productive and high-priced orchard lands in California, Oregon, and in some sections of Washington.

It is stated by those who have made a study of the situation, that farmers on this tract are earning annually from two to three times the original cost of the land. This cost, if the writer's memory serves him properly, was \$35 per acre.

It will thus be seen that the man who settled on the land at the time of its opening and who "stayed with the game" is beyond the need of help from money lenders.

This peculiarly fine condition in Idaho is due in part to the fact that the soil and climate conditions of that state make it an ideal one for the propagation of seed-bearing plants. Many of the large seed houses are now buying their stock from farms operated under their direct supervision and the reports indicate profits of such magnificent proportions that we hesitate to quote them—a profit of \$200 per acre per annum for seed is not uncommon, and this figure is frequently surpassed.

This statement will apply equally well to other sections of Idaho and should interest the land hungry, no matter where they are located.

We ask you to read our short editorial under the heading "Land for the Landless," so that you may learn that there are still opportunities, some perhaps equally as good. The Department of the Interior, Washington, D. C., will give additional information.

**Thoughts on  
International  
Irrigation  
Congress**

The Twenty-third Irrigation Congress, re-named the International Irrigation Congress, has come and gone and adjourned without settling on the place of the 1917 meeting. The Congress, as a whole, was a success, and the various papers presented were more interesting than have been listened to by the writer in his many years of attendance as a delegate. This was particularly true of the talk by the president, Richard F. Burgess, at the opening session.

The evening session of Monday, October 16, was enlivened by a debate between Judge Will R. King, chief counsel U. S. Reclamation Service, and Judge Carrol B. Graves of Seattle, Wash., on the resolution—That Irrigation and Swamp Land Reclamation Can be Undertaken more Advantageously by Government Activity than by Private Enterprise, the affirmative by Judge King and the negative by Judge Graves.

The AGE will publish Judge King's remarks in its issue of November, and those of Judge Graves in its December number. Both talks were masterly and will prove interesting to all of our readers, no matter on which side their sympathies lie.

The absence of many of the "old guard" was noticeable, and this brings to mind the fact that the attendance was woefully small when the importance of the subjects discussed is considered.

El Paso is renowned for its hospitality and the delegates and other visitors have no ground for complaint in any particular.

The fact that no place was chosen for the 1917 Congress indicates the correctness of our often repeated statement that the Congress, as at present conducted, has passed its days of usefulness, and a definite change in its plan must be made before it will reach a point where the delegates are the water users and operators on the land, rather than those who are in attendance from curiosity or with an ax to grind.

It is safe to say that there were not one hundred water users in attendance as delegates, the balance being those who took part in the program. This is to be deplored, as the papers delivered would have been of incalculable value had they been presented to and absorbed by the right class of people—those who need the information—the men on the land.

The thought comes to us that the Government could make no better investment than to send a full copy of the proceedings of this Congress to each one of the 90,000 water users under federal projects.

Beyond this suggestion, however, is the old argument of the AGE that the delegates to these meetings should be water users rather than curiosity seekers. A congress of water users is the coming



proposition, and it should be held annually in some centrally located city. Moreover, the heavy expense attached to the International Irrigation Congress should be eliminated. What sense is there in paying a secretary a salary of \$3,500, with additional help that brings this item to five or six thousand dollars a year, when the entire work can be performed, in not to exceed two months, at an expense of one-third or one-half of that amount? To illustrate this, let those who are familiar with the situation look over the history of the Dry Farming Congress. These thoughts will be given attention should the water users secure control of the organization.

Think this over, Mr. Water User, and write us your opinion.

#### Move to Help Water Users

Mr. Edward Gillette of Sheridan, Wyoming, chairman of the Reclamation Service Board of Review for the Northern Division, has sent the AGE an article entitled "The Reclamation Service Problem," which will be presented to our readers in our issue for November.

The subject discussed by Mr. Gillette is of such importance at this time that it is a source of regret that it cannot be crowded into this number of the AGE. The general trend of the thoughts expressed is in favor of the settler, and is in no way complimentary to the men who are responsible for conditions as they now exist.

"Impracticable and impossible conditions," as Mr. Gillette expresses it, were, and still are, imposed on the helpless settler.

It is to be regretted that Mr. Gillette and others of his class could not have attended the meeting of representatives of the various water users' associations held during the days of the recent International Irrigation Congress at El Paso.

The editor of IRRIGATION AGE attended one of these meetings and learned that there is a great diversity of opinion among these gentlemen. This difference is so great that no definite action was taken beyond the preparation of a resolution which was presented and passed by the Congress calling upon the Government to take over and maintain all of the top loads of the federal irrigation systems such as dams, reservoirs, etc., and make a charge for maintenance and distribution of water to be paid in annual or semi-annual payments, this charge to include also interest on the investment.

It was apparently the sentiment of the men composing these meetings that this plan would relieve the settlers of unnecessary burdens and at the same time prove a safe and paying investment for the Government.

Not having a copy of the resolution as finally passed, the writer is only able to give the gist of the

plan which is no doubt fully outlined in the resolution proper.

As suggested, a man of the wide and varied experience of Mr. Gillette, could have materially assisted this body of water users who were, in a way, working at cross purposes.

It affords much satisfaction to those who have the interests of the water users at heart to know that thinking men like Mr. Gillette are in sympathy with them, and stand ready to assist in any movement which will tend to better their condition.

#### Director Davis Lauds Mr. Brown

Director Davis of the United States Reclamation Service presents in the October number of the Reclamation Record a very kindly-worded article concerning Mr. Hugh Arbuthnot Brown, editor of that publication, which clearly indicates to its many readers who is its responsible editorial head, a matter that has not previously been made public.

The impression has prevailed that C. J. Blanchard was in charge of its make-up, but the statements by Mr. Davis clears up the situation and we may, from now on, know who is presenting to us so much interesting and authentic information.

Mr. Davis informs us that the editor of the Reclamation Record has been diligent in securing photographs and data from water users as well as from the engineers and the legal staff of the Service. This is evidenced by the high class of matter presented in the columns of the Record, and Mr. Brown is entitled to all of the encouraging words that have or may be said of him by Mr. Davis and others in the Service.

In presenting this descriptive or biographical sketch, Mr. Davis states that the Reclamation Committee considered for some time the enlargement of the scope of the Record to make it more generally useful, and furthermore that it was a venture that was entered upon with "some trepidation as it was feared that it might arouse criticism."

The Director says further that "Searching inquiries were made by the House Committee on Appropriations, and they were furnished with copies of the Record and also some comments of the water users who appreciated the periodical. They (the House Committee on Appropriation) were invited to criticize and were persistently asked whether the publication was going beyond legitimate bounds, and while some doubt was expressed, no criticism was actually made, and the Record in its enlarged form, may be considered to have amply justified itself both from legal and financial standpoints."

Mr. Davis has evidently taken it for granted that an opinion by members of the House Committee on Appropriation decides definitely the question

as to whether the United States Government or any branch thereof may or may not enter into the periodical publishing business. The gentleman is no doubt sufficiently familiar with the history of the Record to know that it was originally published as a bulletin to post engineers and others interested as to the details of the work under the Reclamation Law, and that there was no intent on the part of those who started it to make a news journal or produce anything that would come into competition with other publications in the Irrigation or Engineering field.

As the writer views the situation, the Record was enlarged with the full idea of placating dissatisfied water users.

If the United States Government is entering the publishing business and is to issue regular editions of news journals, where will it stop? Perhaps it may suit the Secretary of State to issue a daily paper in which all inspired news may appear first to be copied later by the daily press of the country, or may it not occur to the Department of Labor that a monthly journal would keep it in close touch with the laboring classes? What, again, is to hinder the Government starting an engineering journal in competition with the leading engineering publications, or mayhap a coal publication?

If the plan inaugurated by the Reclamation Service, a branch of the Department of the Interior, is followed, we may have many official Federal publications in the future so that sentiment may be shaped in all branches of industry to suit the party in power, and it would not be a far step to give Government-owned publications a political complexion to suit the reigning powers of future years.

Once more we ask, is the United States Government in the periodical publishing business?

#### HOW TO FIGHT GUMMOSIS

Old cankers of cherry gummosis should be cleaned at once if the damage caused every year by this disease is to be materially reduced, according to Professor H. P. Barss, of the Oregon Agricultural college department of plant pathology. New infections should be treated as soon as they appear. The organisms that cause the cankers live over winter in the edges of the old cankers, and start out late in winter to enlarge the old injuries and infect new areas and other trees. All infected bark should be removed with a draw knife or other tool, care being taken to cut out all discolored portions or even a little above and below them. The wound should then be washed with a 1 to 1,000 solution of corrosive sublimate, allowed to dry, and coated with a good tree paint. Tablets for the wash can be got from the druggist, who will explain how to prepare, use and handle the deadly poison. Bad cankers sometimes form with but slight exudation of gum, and careful watch must be kept all spring for their first appearance, and for blighted fruit spurs and buds.

#### Intensive Farming In Kansas

By E. E. Frizell, President Kansas State Irrigation Congress

That the smooth valley lands of western Kansas, which were stretches of prairie country a few years ago that could be purchased for a mere song, can, through irrigation and intensive farming, be developed until they are worth \$200 an acre, was the assertion of E. E. Frizell of Larned, president of the Kansas State Irrigation congress, in an address before that body at the annual meeting in Larned.

"By intensive farming," said Mr. Frizell, "I do not mean that farmers should grow radishes and lettuce and other garden truck, but such crops as alfalfa, sugar beets, and potatoes, which command good prices. After growing these crops for a few years the land will produce wheat, oats and corn equal to or better than that grown on the high-priced lands of central Illinois and Iowa. For 30 years I have been preaching, teaching and practicing irrigation in Kansas.

"The farmer should do more diversified farming instead of growing wheat continuously for 30 years, as we are doing in Pawnee and adjoining counties. Some of the eastern Kansas farmers have almost reached the end of their string in growing wheat, and such farmers should recoin the old slogan, 'You must irrigate or emigrate.' My advice to the young man is to go west and irrigate.

"We grew enough alfalfa and sugar beets the dry year of 1915 to pay the entire cost of our pumping plant. The year 1915 we did not irrigate an acre. That year we needed a reversible pump to pump the water off of our lands. This year irrigating is like the latest style in ladies' hats, very fashionable. It will become more so each year.

"I predict the time is not far distant when every county in the state will have successful irrigating plants for growing fruit, berries and vegetables. In the western half of the state thousands of acres of alfalfa and other field crops will be irrigated. The people of Pawnee county proudly boast of growing almost eight million bushels of wheat in one year, or one thousand bushels for every man, woman, and child in the district, yet we are buying apples from Oregon, potatoes from Idaho, grapes from New York, onions from Texas, celery from Michigan, cabbage from Iowa, peaches from Arkansas, and sugar from beets grown in Colorado. All of these crops can be successfully grown by irrigation in Pawnee county.

"Pawnee county has 150,000 acres of smooth, level valley land underlaid with an inexhaustible supply of sheet water at a depth of from 10 to 30 feet, and there are many counties in the state that have from 50,000 to 100,000 acres of similar land."



## IRRIGATION AS A MEANS OF PREPAREDNESS FOR DEFENSE

JOHN M. HESS

In the Country of Mighty Endeavor, the land of the Colorado, I have seen the American with his bare, unaided hands lay hold of the work of a nation, and through twelve long, weary years wring victory from Nature and force the desert to "blossom as the rose."

I have seen that nation's government destroy that work ruthlessly and heartlessly turn away these Americans, uncompensated, reduced to beggary, to start life anew or to die in the almshouse.

Again, I have seen the American bare-handed and unaided, through another twelve years of unutterable hardship, aid that same government to turn seven million dollars, niggardly doled out through that long twelve years, into seven hundred million dollars' worth of valuable farm property, which will within twenty years more be valued at seven billion dollars.

A seven-billion-dollar oasis in the desert, which joining hands with the great Imperial oasis to the southwest and the great Palo Verde oasis to the

eight or ten years, after costing us a quarter of a million per annum, and has been a constant menace besides.

Yes, to this mighty Laguna project this same government has voted a niggardly half-million dollars, and has voted to the navy four hundred fifty million dollars and to the army four hundred seventy million dollars, and to the Mexican punitive expedition one hundred thirty-five million dollars. One billion dollars spent on war in times of profound peace. We are at war with no nation.

"Who taketh the sword shall perish by the sword," is the unchangeable word of God, and is spoken to us today, whilst bleeding Europe cinematographs the word in fire and blood. In defiance of that word we have taken into our hands, in this year of our Lord, a billion-dollar sword.

Listen to what that billion dollars would have done for our county. "But we must be prepared," you cry. Yes, yes, I know. Let me show you what preparation it would have given us.



Trestle and Fill at Downstream Toe, Calaveras Dam, Owned by the Spring Valley Water Co., Being Constructed to Supply Water to the City of San Francisco, Cal.

northwest, and the great Salt River oasis to the northeast, will be worth more to the nation in that same twenty years in actual cash value than the entire American navy of today, and as a matter of defense in case of war with Japan, than "fifty first-class battleships of the line."

And yet these projects, The Laguna, the Imperial, the Palo Verde, and the Roosevelt, have altogether cost the government less than the price of one such battleship, and must be paid back to the government dollar for dollar, besides paying taxes whilst the dear battleship goes to the scrap heap in

With the Mexican punitive expedition we sent men there to watch. With that \$135,000,000, had we summoned Goethals with his mighty Panama engineers and the 200,000 men we have there, all told (standing army and national guards) and placed this grand old man in charge, and directed him to place these men as he needed them (so as not to interfere with their accessibility for service, about as follows: one-twentieth on the lower Rio Grande, one-twentieth on the Little Colorado, one-twentieth on the middle Rio Grande, one-twentieth on the Pecos, one-twentieth on the upper Rio Grande, one-twentieth



in the Deming Basin and the White River, one-twentieth in the Wilcox Basin and the San Cruces River at Nogales, one-twentieth on the upper Gila, one-twentieth on the middle Gila, one-twentieth on the lower Gila, one-twentieth on the Colorado at points for construction of canals to fill dry lakes lower than the sea level, including Death's Valley, one-twentieth at Parker (for the great dam there), one-twentieth at Black Point for the Palo Verde project, one-twentieth on the Colorado between Palo Verde and the Laguna dam, one-twentieth to finish the Laguna project and to construct permanent intake for the Imperial project, one-twentieth in the San Diego country for the preservation and development of the water for San Diego on the creeks and small rivers adjacent; yes, and the crowning glory of it all, one-twentieth to extend the works on the Colorado into Mexico (with her consent) making her a present of the water now going to waste, calling on Mexico to aid, making her a present of the rarest "gem of agriculture" in all her domain; that would be a punitive expedition that would resound down the ages of time, inaugurating a new epoch among nations. The remainder of the force to be distributed at the pleasure of the chief. With this force the construction of roads joining all these points would now have been nearly complete, and the basis well laid to reclaim, within the years of 1916 and 1917, land worth in actual cash value the combined navies of the civilized world. The men would be drilled weekly, inured to the country, and would be aiding in engineering schemes unequalled in the world. The land so reclaimed would have returned to the government many times its cost and the number of men could have been doubled and put on a decent wage. The bonds on the land would have paid the bill; as it is, our men have dug useless trenches in the sand, made "hikes" from point to point like boys and feeling like fools, and shamefully begging to be allowed to come home. Can you blame them? These men are Americans who feel and think as Americans, who love to do "something worth while." On these projects thus inaugurated, Goethals could use 250,000 men to the end of 1917 and by that time they would be well drilled, disciplined, and as hardy as any troops in the German trenches, capable of meeting the world in arms, and would have done a work of incalculable value to their country and to the world. As it is, the money is wasted, and the men half prepared and anxious to quit in disgust. One hundred thirty-five millions thrown away, our nation made ridiculous and patriotism shamed.

Yes, but what about defense? I have provided you an army of a quarter of a million and made it pay big. It has cost you nothing under my plan. As it is, you have wasted \$135,000,000.

Our most vulnerable point is up the Colorado River. It is open and undefended. I want one-tenth of that billion (\$100,000,000) that you are going to waste on army and navy placed on the Colorado, together with 50,000 troops of the United States army. Under the direction of Goethals and his mighty Panama engineers, with the Ludys, Yarwoods, the Marriables, the Sanguinettas, the Hodges, and the countless able men along the river that know it, there will be placed a hydro-electric power plant every 12 miles throughout the length of the 2,200 miles of this mighty river and its branches. These men

with this money will conserve every drop of its 132,000 cubic second feet of maximum flow; they will reservoir its flood-wave in the 10,000 box canyons along its mountain sides, and run cool and life-giving to the hungry, waiting desert that has longed for centuries to give its blessings to its children yet to be; they will fill the 1,000 "desert dry lakes" adjacent to its mesas, and keep them forever replenished, until all the mountain desert shall drink from the cloud mists formed here in its valley bosom, and the cattle feeding on a thousand hills shall glad the eyes of man where today are the bare rocks only; at each dam they will place their silt pit, for the enriching of the mesas, and their boat and ship locks that shall bear a nation's commerce to a waiting world, and the waters at the dams they will harness to the turbine and the dynamo, creating electric power for transportation, sending their trolley cars for freight and passengers through every square mile of the country, and power for manufacturing all their raw products into finished articles of commerce, for lighting the homes and for developing the mines within 200 miles of each hydro-electric dam center, every 12 miles throughout the territory 400 miles wide by the full length of the river, in ten short years from the time Goethals is done, your reclaimed land will be worth \$50,000,000,000. Fifty billions in cash. The desert reclaimed is the ideal home of mankind. Is that not a fair return for the one-tenth part of this billion dollars that is destined to utter waste?

In doing this we have rendered our weakest point (the Colorado River) invulnerable, and made it our strongest bulwark in time of trouble. We have injured no one, have quarreled with no one, but have "subdued the earth" and have provided homes for at least ten millions of people, the most beautiful and healthful in the world, homes not for a little while, but for all time, as long as the river runs to the sea; and have created in perpetuity an annual income that would buy the entire combined navies of all the civilized countries of the world. Is it not enough? All this for one-tenth of what is to be wantonly wasted. Shall we forsake what God has given us to do to ape the bully of the earth? God save his people from this billion dollar sword that our Congress has just voted for us.

I have not space to give you the development even in outline, but I want one-tenth of the billion spent in same kind of development I have outlined for the Colorado, provided with an equal number of men for the rivers of the great northwest. The territory here reclaimed and values added would equal that on the Colorado.

I want an equal amount (one-tenth of a billion) given to Missouri River and its tributaries. An equal amount given to the Mississippi. An equal amount and men to the Ohio and its tributaries, and the same plan of reservoiring, diverting and controlling and utilizing power and irrigation in each of these projects, and in so doing the taxable properties and values in these valleys will be multiplied by 100 in less than ten years from the beginning of the work.

I want one-tenth used on the rivers of the south in exactly the same way and one-tenth on the rivers of the Atlantic seaboard.

The remaining three-tenths I would be glad to



see used, together with the remainder of the United States army, to build the very much needed coast railroads, with mobile artillery of the best and most effective patterns mounted on heavy trucks, with double tracks for mobilizing and with numerous switches for sidetrack firing, should be provided. All our sea coast available for landing large bodies of troops should be so protected, and all our harbors and river mouths should be provided with such tracks, and the artillery should be made and mounted and a double force efficiently drilled in handling the same. These roads would more than pay for their construction and are much more effective for coast defense than battleships can possibly be.

The submarines we are building for the allies should be kept at home, and instead of building battleships, provide the coast with such defensive ordnance as will make the approach a matter of certain destruction to any ship, no matter how heavy her guns may be. The solid earth will support guns that can deliver projectiles at twice the distance ship-borne guns can carry, hence, a properly provided mobile coast artillery could destroy any hostile fleet before it could get into range, and our means of rapid communication would keep our artillery posted where to mobilize. So clearly is this the case that no time should be lost in making this preparation.

We need an army of 500,000 men, but where are we to get it? Do you suppose that men who are

worth a d—— will work for \$13 a month and their board?

Let Congress determine to build these coast defense railroads and offer to pay the usual railroad builders' price for men, with the understanding that all workmen would have to enlist for three years and would constitute the regular army of the United States and be subject to one day's drill out of seven, their wages to be paid twice a month, and you will have the full quota volunteered in less than thirty days, and they will be the flower of Young America.

Put these men to work on these coast defense railroads and in six months you will have the finest coast defenses, manned by the finest and most enthusiastic body of men the world has ever seen. Let each company of men remain on one particular part of the road permanently, so that they will become thoroughly familiar with every part of that section of defense. Men, like bees, fight hardest to preserve what their own labor has built. Every mile of these defensive railroads will be a most valuable outer belt line of the utmost economic and mercantile value—permanent improvement worth twenty times its actual cost right from the very start. Every acre of land along these roads will advance from two to ten times its present value. This increase in value alone will more than pay the cost of the roads, and, besides all this, you have provided the country with an army—an army that will pay.

## GENERAL STATUS OF IRRIGATION IN KANSAS

H. B. Walker, State Irrigation Engineer, Manhattan, Kansas.

Does pumping for irrigation pay? This is a question yet unanswered for many who are considering irrigation in Kansas. Indeed it is a most difficult question to answer. In fact, no direct reply is possible. Every farmer must consider the problem of pumping from a broad standpoint and then use his own judgment for a satisfactory answer.

Kansas has not yet secured enough data covering continuous records of pumping operations to tell definitely if the average man is successful. Information of this character is needed to put irrigation in its rightful economic place in agricultural development. When it can be shown without question that a pumping plant is a business investment for the average farmer, then it will be an easier matter to borrow money to develop pumping districts.

During the last two years I have made investigations of over 125 pumping plants in Kansas for the purpose of studying the methods and practices of farmers who are pumping for irrigation. These investigations were made of typical farms throughout the western third of Kansas. The general premises among the farmers owning pumping plants are that irrigation is profitable. In very few cases, however, are these premises founded

upon fact. Nearly everyone "thinks" pumping for irrigation pays, but when it comes to backing these impressions with figures to show net profits there is a lack of definite knowledge.

Among the 125 pumping plants visited less than five per cent of the owners actually knew in dollars and cents whether or not their plant was profitable. Many had good reasons to believe that it was a good investment, and in every instance the owners of a plant felt sure that it would pay if carefully handled. In every instance where a man had kept a record the pumping plant was a profitable investment. This in itself is encouraging. It was noticeable, moreover, that the man who had kept a record was the most careful operator of his plant.

Judging from the records obtained on the 125 irrigated farms in Kansas at least 40 per cent of the individual farm pumping plants of the state are non-revenue producing investments. We have in Kansas approximately 225 farm irrigation pumping plants. Practically 90 of these plants are not operated in a way which will produce revenue, and the investment is so placed that depreciation is always going on. This lack of operation is not generally due to poor pumping equipment or lack of water, but it is due almost entirely to the indifference of the owner. It must be admitted that an efficient

pumping plant is an important factor in successful irrigation, but among the many Kansas idle plants are numerous first class installations. A good well with a good pump and suitable power does not insure profitable irrigation. There must be a man behind the plant to consistently and persistently operate the machinery to supply the water for the best yields. The greatest boost for Kansas in the way of irrigation is not more wells and more pumps to throw more water, but more men with practical irrigation experience to operate these existing idle plants.

The idle plant problem emphasizes the "personal equation" in the success of individual pumping plant operation. With every other factor perfect, if the individual has no natural liking for irrigation, his efforts are almost sure to meet with failure. There are many misfits in irrigation work.

used irrigation pumping plant is a monument to a dead investment.

In Kansas, where the pumping plant is not used for a very long period during the year, the electric motor is a very desirable power. A first-class motor represents an investment of about 30 per cent of the cost of oil engine of equivalent horsepower. The depreciation in an electric motor is relatively small. With a slight depreciation and a low investment we are eliminating two sources of expense which must be considered in pumping plant operation. When these are considered as they should be electric power at a relatively high rate quite often has an economic advantage.

My investigations included 16 typical shallow water electric driven plants in the Garden City district. In no case did I find the farmers dissatisfied with the electric driven plant.



Cars Dumping Rock From Trestle, Calaveras Dam, California.

We must not, therefore, judge pumping by individual conditions; we should form our conclusions more from average conditions. A large number of our idle plants were installed to demonstrate that water could actually be secured in quantities sufficient for irrigation. These demonstrations, so far as they were intended to apply, were successful. It has been definitely demonstrated that the water is there and machinery does lift it to the surface. The new settler, however, who comes into our pumping district to investigate conditions views with considerable apprehension the idle pumping plant, and why should he not do so? Every un-

Keep away from freak ideas and freak machinery, was the advice of Chester Carter of Garden City, a graduate of the agricultural college, who read a paper on "Recent Developments in Pumping Plant Installation."

"Probably the most striking change, and the one which would appeal to the casual observer," said Mr. Carter, "is the general improvement of the looks of pumping plants and their permanent character.

"As has been the tendency in all branches of building and construction in the last few years,

(Continued on page 188)



## 320,000 ACRES THROWN OPEN BY LITIGATION COMPROMISE

Settlement of the so-called Wyoming Central litigation, involving the rights of settlers under the Riverton ditch of the Wyoming Central Irrigation Company's project in Fremont county, has been reached by a compromise which was announced September 30.

The dispute had been in progress for ten years and was involved in more than twenty lawsuits which now will be discontinued. Under the compromise agreement the settlers under the ditch, the Wyoming Central Company and the bondholders of the company all make concessions and during the first week of October the settlers were given a clear title to the ditch for a consideration which is not stated.

The Wyoming Central project contemplated the reclamation of 320,000 acres, but only the Riverton ditch, covering 15,000 acres, was completed before Joy Morton of Chicago, and his associates in the scheme decided that the whole project was not feasible and declined to go ahead.

Meanwhile settlers on lands totaling about 8,000 acres had made payments to the company and protested its abandonment of the scheme. The many angled litigation now settled by compromise, followed. The last legislature appropriated \$3,000 to enable the settlers to proceed with the litigation. The abandoned project is the largest ever undertaken in Wyoming.

## NEWS NOTES FROM IRRIGATION PROJECTS OF THE COUNTRY

### California

Twenty-six miles of the main canal of the Anderson-Cottonwood irrigation district's system is completed. Only eight miles more remain to be excavated. Over half of the laterals are finished. The land to be irrigated lies in the vicinity of Redding.

At a recent session of the board of directors of the Terra Bella irrigation district, held at Terra Bella, the initial tax levy was made, amounting to \$36,000. The valuation placed on the land in the district is nearly \$600,000, the highest assessment acre being \$60. The tax rate was fixed at six per cent and the taxes will be due in two installments, in December and June. The district has established a suite of offices in the First National Bank building of Terra Bella.

The contract for the construction of an irrigation system, costing \$1,250,000 to water approximately 16,000 acres of land lying between the town of Lindsay and the foothills, was signed recently by the directors of the Lindsay-Strathmore Irrigation System.

The Southern Lassen irrigation district in Lassen county, Cal., has completed surveys for an irrigation project eventually to involve the spending of several millions of dollars. A bond election will probably be held within the next sixty days to vote on an issue of upwards of a million dollars to be used in constructing the first part of the work. This will include 60 to 75 miles of concrete lined canals and one dam to retain floodwaters. Wm. L. Wales, Woodland, Cal., is engineer for the district.

### Colorado

Contract has been awarded to J. M. Groesbeck of Springville, Utah, for earthwork on the Grand Valley project, of the total value of \$5,394, involving the moving of approximately 3,500 cubic yards of material. The work is in connection with the laterals of the project, and is located in the vicinity of Grand Junction.

At a recent meeting of the Reclamation officials in Denver, the Uncom-

pahgre project in Colorado was allotted the sum of \$360,000 for the year 1917, which was the full amount asked for by the officials of the project.

The local land office at Montrose, Colo., has received advice from Washington to the effect that the E½ of section 25, T. 50 N., R. 8 W., N. M. P. M., which had been withdrawn for use in connection with the Uncompahgre project, will be subject to settlement under the public land laws of the United States on and after November 7th at 9 a. m. and will be subject to entry, filing or selection on December 7, 1916, at 9 a. m. at the United States land office at Montrose, Colo.

### Idaho

An election was held at Ontario recently to decide upon the issue of bonds to the amount of \$750,000 for the Warm Springs irrigation project, which covers 35,000 acres of land between Ontario and Vale. Only land owners were permitted to vote. The proposition carried by 86 to 32. The proposed work consists of a reservoir and the enlarging of the ditches under the old systems. The reservoir will be built on the middle fork of the Malheur river at a point four miles beyond Vale. The reservoir will cover 25,000 and will have a capacity of 150,000 acre feet of water, which with the flood waters each year is sufficient to irrigate fully 50,000 acres. The dam for the reservoir will be 87 feet high and 200 feet long at the bottom and 350 feet long at the top. State and Federal government each appropriated \$50,000 to carry on the work. The cost of the reservoir will be less than \$400,000. This includes the site and the dam.

D. C. MacWatters, general manager for the Twin Falls-Oakley irrigation project has failed to secure the consent of the state land board to rescind its order made last spring giving to the settlers on that project an extension of time in which to make final proof. During November the board will take up the matter with the attorney for the settlers, and if he consents

to rescinding the order it may be rescinded at that time. Mr. MacWatters explained that the company wishes to cut down the acreage in the project to 26,000, as recommended, and rescinding of the order would only affect non-residents.

### Washington

The Whitestone Irrigation and Power Company has succeeded in raising the entire funds to complete the first unit of 5,000 acres of their irrigation project. Active construction of the immense ditch and flume will be started immediately.

The United States reclamation service has established an engineering camp at the intake of the Mabton syphon feeder canal, where the water is discharged from the main Sunnyside canal, and the party is making final surveys for the construction of irrigation works for the watering of over 4,000 acres above the present gravity canal. The power for pumping will be developed from the drop of the water into the Mabton canal.

Two thousand acres will be added to the irrigated acreage of the Yakima Indian Reservation this year as the result of permission from the department for expenditure of \$5,000 for construction of a distribution system from Wanity slough. This is entirely separate from the main system, from which about 35,000 acres are watered.

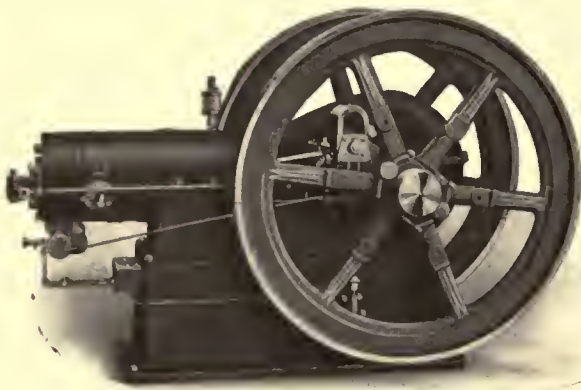
Approximately 100,000 acres of land can be feasibly irrigated in the Willamette valley at the present time, results of an investigation just completed by the United States Reclamation Service in cooperation with State Engineer Lewis show. A joint report of the inquiry into irrigation and power development possibilities of the Willamette valley has been issued recently.

### Miscellaneous

Under authority of the Secretary of the Interior, contract has been awarded to the Pearson Construction Com-

(Continued on page 189)





## The Successful Kerosene Engine

Dealers wanting a line of Kerosene Engines will do well to investigate the Lauson Line. They start and operate on Kerosene as easily as a regular gasoline engine and give full rated horse power.

They operate on Kerosene, Distillate, Motor Spirits and other cheap oils, using less than one pint of fuel per horse power hour on one-half to three-quarter load and full load.

They operate with a clear, clean exhaust, regardless of load conditions, the same as a gasoline engine—a feature found only with the Lauson and which shows that all the oil is vaporized and used during each cycle, consequently no raw fuel is left in the cylinder to dilute the lubricating oil. For this reason Lauson Kerosene Engines are equally as long lived as a gasoline engine.

Being of the throttling governor type they regulate as closely as any ordinary steam engine and give a steady, smooth power.

Built in sizes from 2½ H.P. to 100 H.P. in the Portable, Semi-portable or stationary types. Write for Special Bulletin and Dealers' prices.

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**United States Press Bureau**  
Rand McNally Bldg. Chicago

(Continued from page 186)

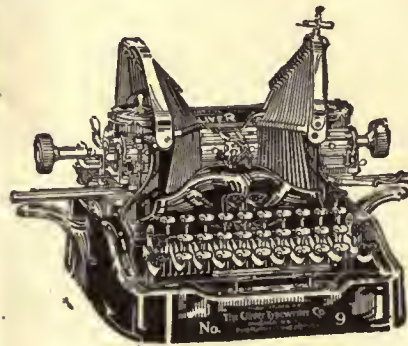
there has been a decided tendency towards the use of concrete in every place possible. In very few plants of recent construction will one find the old frame house and the old-style wooden curb in the well, or the unsightly rattletrap galvanized iron or wooden discharge box.

"In nearly all of these plants the pump has been placed on a neat and substantial concrete pit, and the pump and motor, or engine, housed in a solid and permanent-looking house constructed of concrete blocks.

"A great deal of this improvement in the appearance of the completed pumping plants can be traced directly to the present attitude of the owners rather than to those who are installing plants. The owners no longer look upon the installation of a pumping plant as a doubtful investment, but realize that they are increasing the value of their land by at least \$50 an acre and that they are installing something which, by proper installation and care, may be made to last a lifetime, and something that by proper handling may be made to pay big returns on the investment. They therefore insist that they get efficient plants which will add to and not detract from the looks and general appearance of the land.

**WANTED**—Manager, also civil engineer; 68,000-acre project; long experience and proven ability must be shown; give full particulars and references first letter. Address Alba Heywood, secretary, Cameron County Irrigation District No. 2, San Benito, Texas.

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(Continued from page 187)

pany, 754 New York block, Seattle, Washington, for earthwork and structures on the Flathead project, Montana, at a total price of \$38,236.50. The work involves about 125,000 cubic yards of excavation, 495 cubic yards of reinforced concrete, 1,000 square yards of paving, 10,100 square feet of canal lining, 3,400 linear feet of concrete pipe, 210 cubic yards of dry rubble wall, and placing 70,000 pounds of steel. The work is located from three to ten miles west of Ronan, Montana.

Under authority of the Secretary of the Interior contract has been awarded to Winston Bros. Co. of Minneapolis, Minn., for Schedules 1 to 7, both inclusive, for earthwork and structures, Stations 1280 to 2280, Ft. Laramie Canal, North Platte project. The total contract price for the work awarded is \$270,061. The work embraces the excavation of approximately 1,556,000 cubic yards of material and the placing of approximately 1,460 cubic yards of concrete. The work is situated near the Bridgeport-Guernsey line of the C. B. & Q. Rail-

(Continued on page 190)

## FOR SALE

All or any part of a modern, complete water works, in operation *less than 30 days.*

Equipment consists of the following:

20 miles of Abendroth & Root 20 inch spiral riveted asphalted pipe with wrought steel bolted flange couplings.

3—150 H. P. Erie City water tube boilers, with under-feed stoker system.

2—Pumps, each 1,500,000 gallons capacity.

### Another Big Snap

3—500 8-ft. sections of pipe made up for an export order, but never used. Section range from 12 in. to 42 in. in diameter, and from No. 1 to No. 16 gauge steel. Double riveted. Can be used to advantage for smokestacks, or may be rolled into plates.

Get our low quick sale prices.

**HARRIS BROTHERS CO.**  
35th & Iron Sts., CHICAGO

### STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of The Irrigation Age, published monthly at Chicago, Ill., for Oct. 1st, 1916.

State of Illinois, County of Cook.  
Before me, a notary public, in and for the State and county aforesaid, personally appeared D. H. Anderson, who, having been duly sworn according to law, deposes and says that he is the publisher of The Irrigation Age and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—D. H. Anderson, 30 No. Dearborn St.

Editor—D. H. Anderson, 30 No. Dearborn St.

Managing Editor—D. H. Anderson, 30 No. Dearborn St.

Business Manager—E. Donnelly, 30 No. Dearborn St.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

D. H. Anderson, 30 No. Dearborn St.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

D. H. ANDERSON,  
Editor, Publisher.

Sworn to and subscribed before me this 10th day of Oct., 1916.

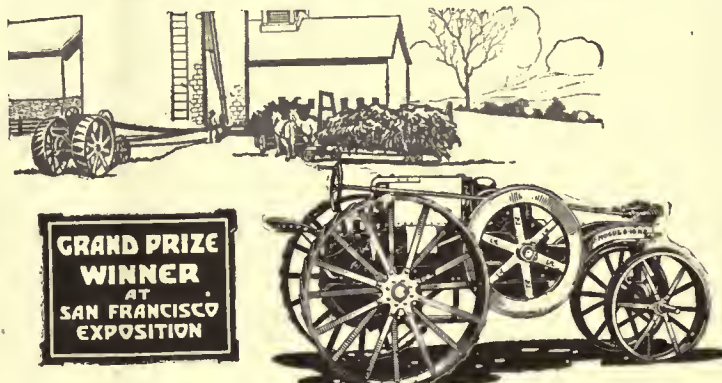
(SEAL)

(My commission expires March 8, 1920.)

MICHAEL J. O'MALLEY.

## Mogul 8-16—A Real Kerosene Tractor

Sells for \$725 Cash f. o. b. Chicago



**WHEN** you buy a tractor, look beyond the price. It is not the price a man pays for a tractor which is of the most importance, but **what its power costs.** A Mogul 8-16 burning kerosene, in 5,000 hours of work, will save more than its original price over the cost of the same power produced by a gasoline tractor. Remember, the 8-16 is a real kerosene tractor, planned and built originally for using this cheap, plentiful fuel. Price is of minor importance compared with **Mogul 8-16** saving.

It is our policy to sell the Mogul 8-16 at the lowest possible price, always maintaining Mogul quality, though nowadays some of the materials are almost unobtainable even at an advance in price of from 50 to 100 per cent over the prices of a few months ago. \$725 cash f. o. b. Chicago is the lowest price at which **Mogul 8-16** can be sold.

Orders placed at once will stand the best chance of being filled without delay. See the **Mogul 8-16** dealer or write us for the story of kerosene before you buy any tractor.

**International Harvester Company of America**

(Incorporated)

CHICAGO

USA

Champion Deering McCormick Milwaukee Osborne Plano



(Continued from page 189)

way, in the vicinity of Torrington and Lingle, Wyoming.

Articles of incorporation have been filed by the Davis-Weber Land Company of Ogden, Utah. The capital stock is \$5,000, divided into 5,000 shares. The company is composed of Emmitt F. Annis, president; Albert E. Annis, secretary, and O. A. Parmley, treasurer. The articles state that the company is organized for the purpose of doing a general land and irrigation business. The principal office of the company is at Ogden, Utah.

Actual work of reclaiming thousands of acres of arid land near Lawton, Oklahoma, will be started within a short time. This work will be under the supervision of the Federal Reclamation Service. It is stated that Lawton has more water than it can use in its reservoir, and the government intends to turn some of this water into irrigation ditches. Terms of the contract between the government and Lawton have been agreed upon, and after the irrigation system is completed the land will be divided into ten acre tracts and sold under government supervision.

The Honey Lake Valley Mutual Water Users Association, with D. S. Dickerson, O. Doyle, C. J. Young, Chas. Hollowell and W. D. Minckler as directors, recently filed articles of incorporation with the county clerk.

A large acreage of land surrounding the town of Reno, Nevada, will be furnished with water. It is stipulated in the articles of incorporation that all users of water in the Honey Lake Valley will become owners of the proposed irrigation system after all costs of construction have been paid, and the users of water are given 25 years to pay up their share of the cost of construction.

With a capital stock of \$200,000, articles of incorporation were filed with Secretary of State Frank L. Houx, at Cheyenne, recently for the Bottonwood Development Company. The firm proposes to "purchase, build or otherwise acquire" irrigation ditches or canals and reservoirs in various counties in Wyoming. Thomas Hunter, John D. Clark and Lloyd C. Sampson, all Cheyenne attorneys, are the directors.

The Reclamation Service has executed a contract with the Morrison Knudson Company of Boise, Idaho, for construction of the Three Mile Falls diversion works, in connection with Umatilla irrigation project, Oregon, at a cost of \$31,865.

The Virginia City and Gold Hill Water Company plans to furnish water with which to irrigate several thousand acres of land in the Carson River Valley of Nevada.

# Alfalfa for profit

**"One-Half the Alfalfa Seed Sown is Wasted Every Year"**

This statement has been made by many recognized Alfalfa experts—men who know what they are talking about.

**They say** that they secured better stands of Alfalfa with 10 lbs. of seed, drilled with the Superior Special Alfalfa and Grass Seed Drill than with 20 lbs. of seed sown broadcast.



THE SUPERIOR 20 X 4 SPECIAL ALFALFA AND GRASS SEED DRILL

There are 20 discs on this machine set 4 inches apart. The construction is such that all the seed is sown at an even depth, and an equal amount of seed in every furrow.

**None of the seed is wasted, when drilled in the ground with a Superior Alfalfa and Grass Seed Drill**

REJUVENATES OLD ALFALFA FIELDS

RENEWES OLD PASTURES AND MEADOWS

PRODUCES BEST STANDS OF MILLET

INCREASES YIELDS OF WINTER WHEAT BY

CULTIVATION and SOWS CLOVER AT SAME TIME

**Saves More Than Two Dollars an Acre on Seed Alone**

Send for Superior Alfalfa Drill folder and read the **strong warranty**

Go to your local dealer and ask to see the Superior Special Alfalfa and Grass Seed Drill. If he will not supply your needs, we will.

**THE AMERICAN SEEDING-MACHINE CO., Inc.**  
SPRINGFIELD, OHIO

FREE—A copy of "Boyd's Farmers' Alfalfa Guide," price 10c, will be mailed free to any reader of Irrigation Age who will write for the book and mention Irrigation Age.

## Here's Something New about California For You

Two parties of Eastern farmers saw California under my personal escort last fall. It was not a land-selling trip—it was solely for investigation.

We were guests of over forty local communities. Their Chambers of Commerce and Boards of Trade provided the automobiles and guides who showed us the agricultural activities in their neighborhoods.

We saw irrigated fruit farms. We saw alfalfa making large yields under irrigation. We saw diversified farming with its sure returns paying still better because of irrigation.

### A Book of Pictures

taken on this trip is now ready for free distribution. We would like to send you a copy.

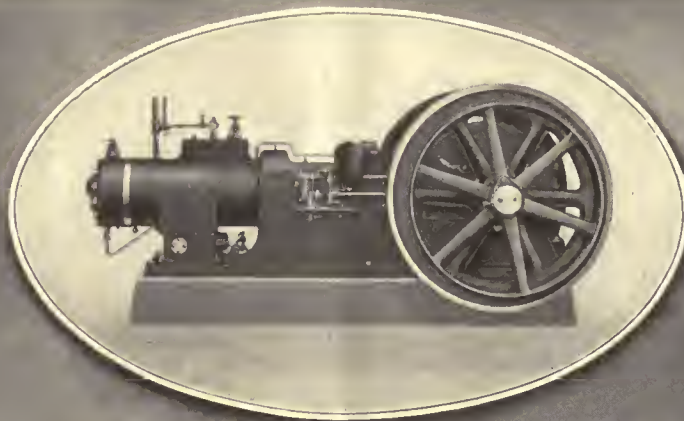
You can prolong your active business life at least fifteen years in California. It is a country where you can farm twelve months in the year. You need not spend a large share of your earnings just to keep warm.

Write me today. Let me help you plan your trip. Reduced fares next Spring and Summer will give you a chance to see the San Diego Exposition and agricultural sections of California at small cost. Winter tourist fares now in effect. Ask all the questions you want and say "Send Farmers' Special Book."

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for  
Irrigation  
Work



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## LOOMIS OIL ENGINE



Loomis Oil Engine being placed on foundation;  
replacing a distillate engine in the pump  
house in the background.



Loomis Oil Engine Installed. Building the new  
pump house over the engine.



More water and enough cheaper water to  
warrant the change to an efficient engine.

ARE YOU PUMPING  
YOUR WATER  
EFFICIENTLY?

A GREAT MANY PLANTS  
OPERATE  
INEFFICIENTLY.

IT means dollars wasted unless you are  
pumping efficiently. We are replacing  
engines that are in good condition mechani-  
cally because we can save dollars enough  
to make the investment profitable.

*If you are putting in a new  
engine it will pay you to start right.  
You will start right if you begin now  
to investigate the Loomis Oil Engine.*

Send for Bulletin No. 501

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**THE JOHNSTON & JENNINGS Co.**  
**CLEVELAND, OHIO.**  
**U. S. A.**

# Several Hundred

Families have moved to Idaho within the past few months. There are many great opportunities to buy rich fertile land at reasonable prices.

Let me send you a crop report showing what returns some farmers received last year—it's an "Eye-opener"—you can do as well.

Complete information will be given you about a section that you are interested in by addressing

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